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Government
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MACKENZIE VALLEY PIPELINE INQUIRY

IN THE MATTER OF APPLICATIONS BY EACH OF
(a) CANADIAN ARCTIC GAS PIPELINE LIMITED FOR A
RIGHT-OF-WAY THAT MIGHT BE GRANTED ACROSS
CROWN LANDS WITHIN THE YUKON TERRITORY AND
THE NORTHWEST TERRITORIES, and
(b) FOOTHILLS PIPE LINES LTD. FOR A RIGHT-OF-WAY
THAT MIGHT BE GRANTED ACROSS CROWN LANDS
WITHIN THE NORTHWEST TERRITORIES
FOR THE PURPOSE OF A PROPOSED MACKENZIE VALLEY PIPELINE

and

IN THE MATTER OF THE SOCIAL, ENVIRONMENTAL AND
ECONOMIC IMPACT REGIONALLY OF THE CONSTRUCTION,
OPERATION AND SUBSEQUENT ABANDONMENT OF THE ABOVE
PROPOSED PIPELINE

(Before the Honourable Mr. Justice Berger, Commissioner)

Yellowknife, N.W.T.

December 12, 1975.

PROCEEDINGS AT INQUIRY

Volume 102

347
M835
Vol. 102

CANADIAN ARCTIC
GAS STUDY LTD.

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APPEARANCES:

Mr. Ian G. Scott, Q.C.,
Mr. Stephen T. Goudge,
Mr. Alick Ryder and
Mr. Ian Roland for Mackenzie Valley Pipeline
Inquiry;

Mr. Pierre Genest, Q.C.,
Mr. Jack Marshall, and
Mr. Darryl Carter for Canadian Arctic Gas
Pipeline Limited;
Mr. Reginald Gibbs, Q.C.,
Mr. Alan Hollingworth &
Mr. John W. Lutes, for Foothills Pipe Lines Ltd.;

Mr. Russell Anthony &
Pro. Alastair Lucas for Canadian Arctic Resources
Committee;

Mr. Glen W. Bell and
Mr. Gerry Sutton, for Northwest Territories
Indian Brotherhood, and
Metis Association of the
Northwest Territories;

Mr. John Bayly
or
Miss Leslie Lane for Inuit Tapirisat of Canada,
and The Committee for
Original Peoples Entitle-
ment;

Mr. Ron Veale and
Mr. Allen Lueck for The Council for the Yukon
Indians;

Mr. Carson H. Templeton, for Environment Protection
Board;

Mr. David Reesor for Northwest Territories
Association of Municipal-
ities;

Mr. Murray Sigler for Northwest Territories
Chamber of Commerce.

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Yellowknife, N.W.T.

December 12, 1975.

(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

MR. ANTHONY: Mr. Commissioner,
before Mr. Lutes recommences his cross-examination,
you will recall yesterday that Mr. Scott asked Mr.
Zoltai about the recommendations found in paragraph
9.2 of the environmental social program report, 73-4
and whether he had any qualifications to add. I'd
ask Mr. Zoltai to respond to that question now.

STEPHEN C. ZOLTAI,
EVERETT B. PETERSON, resumed:

WITNESS ZOLTAI: My response to
it is I would agree with the recommendation\$ in the context
that they are stated in the report.

THE COMMISSIONER: Fine.

MR. LUTES: Now, the long-awaited
question.

THE COMMISSIONER: Well --

MR. LUTES: Well, actually I should
describe this. There was more than one question but it
was just about one thing. It's very brief.

CROSS-EXAMINATION BY MR. LUTES (CONTINUED);

Q Mr. Zoltai, yesterday Mr.
Scott asked you about a question with respect to the
possibility of utilizing the existing C.N.T. line and
I don't want to paraphrase what your response to him
was, but I think it's fair to say that the implication

Zoltai & Peterson
Cross-Exam by Lutes

1 is that if it's possible to utilize some portion of
2 this line, then we should be using it. I'm wondering
3 if I could just get you to tell me about the C.N.T.
4 line. Do you know when it was constructed?

5 A I don't know the exact
6 date but I assume that it's been in place for I think
7 something like 15 years.

8 Q Do you know the purpose
9 for which it was constructed?

10 A It was constructed to
11 carry a telegraph line.

12 Q And this was an overhead
13 telegraph line?

14 A Yes.

15 Q I am advised that the line
16 is simply set on tripod type of system.

17 A Yes.

18 Q So that the overhead line
19 itself was not -- or the construction of an overhead
20 line is not constrained by the ground conditions which
21 exist. Would that be fair?

22 A I would think so. I'm no
23 expert on telegraph lines.

24 Q I appreciate that, but
25 what I'm trying to get clear for the hearing and also
26 in my own mind is the purpose for which the C.N.T. line
27 was constructed, and what it might look like. I am
28 advised for instance, since it was constructed for an
29 overhead line, that it has a very irregular pattern
30 and that it followed the lines of least resistance.

Zoltai & Peterson
Cross-Exam by Lutes

1 A It seems that it follows
2 straight lines as much as possible, in other words it
3 doesn't go around obstructions very much.

4 Q I am also advised that
5 there are drainage problems on the line and I'll
6 tell you what my advice is and perhaps you could comment
7 on them, that there is not only pools of water on the
8 line but there is a tendency for water to move, because
9 of the settling that's taken place, there is a tendency
10 for water to move down the line. Could you comment on
11 that?

12 A That may well be possible.
13 As I said yesterday in my testimony, that the subsidence
14 has taken place over most of the sensitive permafrost
15 area, and this of course would create a depression which
16 may channel drainage.

17 Q I am also advised that
18 from a pipeline engineering point of view that would
19 be an unacceptable condition, whereby water was moving
20 down the channel.

21 A That could well be, yes.

22 Q I have no more
23 questions of Mr. Zoltai. One question of Dr. Peterson.
24 Dr. Peterson, your material recommended the establishment
25 of a monitoring site south of the Willowlake ecological
26 site. Is that correct?

27 WITNESS PETERSON: The south-
28 west corner of the proposed Willowlake site is designated
29 by the metes and bounds description to include a separ-
30 ate monitoring site. The south-west corner of it, it's

Zoltai & Peterson
Cross-Exam by Lutes

1 not south of the proposed Willowlake site, but the
2 south-west corner of it.

3 Q We're talking about the
4 same site then.

5 A Yes.

6 Q You also recommended that
7 the applicants propose the establishment of two monitor-
8 ing sites themselves which they would maintain after
9 completion of the line. Is the Willowlake site one
10 -- to be one of those, or is that a separate establish-
11 ment?

12 A I think that's a matter
13 to be debated. In my opinion the Willowlake site could
14 be one such monitoring site, and in fact I have so
15 recommended; but the other recommendation that I made
16 to this Inquiry was that the applicants be invited to
17 put forward their own proposals as to sites, that they
18 feel might serve their monitoring interests, and if
19 that is done, that any such proposal should include
20 within it not only the site that is proposed as a long-
21 term monitoring site but an adjacent undisturbed
22 control area, so that you really do have a comparison
23 with an undisturbed condition. So that I wouldn't want
24 to leave the impression that the sites that had been
25 proposed to date by the I.B.P. panels are the only
26 pieces of ground that might serve this purpose, and
27 that was the reason that I suggested that the applicants
28 be invited to take initiatives for proposing monitoring
29 sites.

Zoltai, Peterson

~~Cross-Exam by Lutes~~
Cross-Exam by Bayly

1 Q Okay, just so I
2 understand this then. Your actual proposal of a
3 site at Willowlake, there is nothing planned at the
4 present time insofar as a monitoring site at that
5 point. That is just a convenient place where the
6 pipeline is adjacent to one of the sites which
7 would facilitate the monitoring?

8 A To my knowledge
9 there are no specific monitoring plans there as of
10 now.

11 MR. LUTES: That is all my
12 questions, Mr. Commissioner. Thank you.

13 THE COMMISSIONER: Thank you
14 Mr. Lutes.

15 CROSS-EXAMINATION BY MR. BAYLY:

16 Q Dr. Peterson, if I
17 could address my questions to you first. With
18 regard to the committee that you sat on that
19 developed the guideline, could you tell me if there
20 were certain assumptions that you started with
21 prior to developing the guidelines, either ones that
22 were given to you by, as terms of reference for your
23 committee or ones that you just took as basic
24 assumptions?

25 WITNESS PETERSON: I don't
26 recall ever seeing a set of assumptions written on a
27 piece of paper. I think that it goes without
28 saying that there were certain assumptions. It
29 was understood that the research to be done under the
30 Environmental-Social Program was to be directed to

Zoltai, Peterson
Cross-Exam by Bayly

1 environmental and social questions that would arise
2 in connection with an application for a gas or an
3 oil pipeline and not to deal with such questions
4 in relation to alternative modes of moving oil or
5 gas such as tankers, big airplanes or what have you.

6 Q So implicit in your
7 studies was an assumption that some sort of fossil
8 fuel would be moved by pipeline from the north
9 to the south?

10 A Yes, I agree with
11 that.

12 Q And was another
13 assumption that some of the fuel that would flow in
14 this line would come from the Mackenzie Delta
15 region?

16 A Yes, I think that
17 is another assumption and it in fact is reflected in
18 the way that the corridor was defined in the guidelines.

19 Q AND was it also an
20 assumption that gas from the North Slope of Alaska
21 would be some of the fuel that would be transported
22 in this line?

23 A Yes, again, I think
24 for the same reason. That was an assumption and
25 again as indicated by the way the guideline corridor
26 was defined to include two possible routes through the
27 Northern Yukon, yes.

28 Q Now, was the assumption
29 made that there would be eventually more than one
30 facility, one taking oil and one taking gas?

Zoltai, Peterson
Cross-Exam by Bayly

1 A Yes, that assumption,
2 in fact I think that it is more than an assumption,
3 the 1970 guidelines had indicated that the government
4 would be willing to receive an application for one
5 gas and/or one oil pipeline, so if you are questioning
6 me on an assumption that existed in 1972, yes, that
7 assumption was made.

8 Q And in your evidence
9 you have stated that it wasn't in response to an
10 actually application that the guidelines were
11 written. It was prior to receiving an actual appli-
12 cation, that is correct?

13 A Yes, it is.

14 Q But as I understand it,
15 it is also true that it was in response to things
16 that industry was doing and planning to do that
17 the guidelines were brought forward? In other words,
18 exploration, for example, had been going on and had
19 proven out certain resources before you sat down to
20 write the guidelines?

21 A Yes, and I think more
22 specifically in answer to your question, it was
23 certainly known, industry had made it known that they
24 were in fact going to submit an application for
25 a gas pipeline, so it was in response to that
26 expectation that the guidelines were written.

27 Q Yes, and I believe it
28 is true as well that when industry decided that it
29 would look at the west side of the river, that that
30 was considered by the Environmental-Social Committee

Zoltai, Peterson
Cross-Exam by Bayly

1
2
3 as well?

4 A I said that in my
5 testimony yesterday, yes.

6 Q Yes. But that was a
7 response in a sense to their looking at that side of
8 the river?

9 A Yes, it was.

10 Q And when we talk
11 about assumptions, it appears that you did not
12 assume that there would be an application to cross
13 the delta?

14 A I personally did not
15 assume that there would be an application to cross
16 the delta.
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Zoltai & Peterson
Cross-Exam by Bayly

1 Q Now, given that there
2 was an assumption, and I don't put it any higher than
3 that, there was nothing written down but the Committee
4 assumed that gas would come out of the delta, can you
5 explain or shed some light on why there were no studies
6 done related to gas processing plants by the Environmen-
7 tal Social Committee?

8 A Well, I certainly can't
9 speak on behalf of government policy that existed at
10 that time. I can confirm that there were not studies
11 directed specifically to environmental or social ques-
12 tions that would be part of gas processing plants.
13 There were -- I suppose what happens, I think maybe the
14 best explanation that I can give is that when you have
15 research built around an actual or an anticipated
16 industrial development, there has to be some arbitrary
17 definition of the project that you are studying, and
18 the arbitrary definition that was used in our case,
19 in the case of the environmental social program was
20 that the studies were to be directed at trunk pipeline
21 questions. I recall, for instance, a research proposal
22 that was written by someone in the Department of Environ-
23 ment dealing with questions of sulphur dioxide effects
24 upon lichens, and when this project was discussed it
25 was felt that there would not be great amounts of
26 SO-2 produced at any point along the trunk line, although
27 it was admitted, I believe, that there could be signi-
28 ficant amounts at processing plants; but that example
29 similarly detailed research on environmental side effects
30 of seismic lines, those two examples were simply not

Zoltai & Peterson
Cross-Exam by Bayly

1 considered to be within the scope of the environmental
2 social program, which was directing its prime attention
3 to trunk pipelines.

4 Q So it wasn't a question
5 that some of these matters were not brought up; it was
6 felt either by the Committee or the people who were
7 deciding what the Committee should do, that these were
8 beyond the responsibility anyway of this Committee.

9 A That's right. That decision
10 was made on a number of occasions and I can't pretend
11 to know the reasons behind the decisions in each case.

12 Q Yes, so what it in effect
13 means is, though, that that Committee did not study things
14 like sulphur dioxide emissions from gas plants, nor the
15 effects of seismic operations in certain areas, in gas-
16 rich regions.

17 A No, I said in my testimony
18 that it did not --

19 Q Right.

20 A -- and I confirm that
21 now.

22 Q Now, with regard to
23 the question of the corridor, you've given evidence
24 that the corridor concept was developed or refined in
25 your Committee. Where did the idea of the corridor come
26 from? Was it generated out of your Committee or government,
27 or was it something that came from industry and something
28 that you responded to?

29 A Again, I'm not fully famil-
30 iar with all of the history of the use of the word

Zoltai & Peterson
Cross-Exam by Bayly

"corridor" but I think the brief answer to your question is that the word was used in the 1970 guidelines with the indication that government would be willing to receive an application for one oil pipeline and one oil trunkline and one gas trunkline to be located in a corridor, and I forget how the words go on. I am sure you could check it if you wanted to. I think our attempts to elucidate the meaning of the word "corridor" in 1972 came from the fact that the word had been used in 1970 without having been defined at that time.

Q So in a sense you accepted that as a given from a previous set of guidelines. Is that right?

A Yes, I think that's accurate to say that.

Q And having accepted it as a given and within the terms of reference of this Committee, you weren't in a position to say -- to examine corridors per se, you were looking for areas in the Mackenzie Valley which might be suitable for corridors. Would that be fair to say?

A I'm not -- I don't think I understand the distinction that you're making in the question you put to me.

Q Let me try and put it more simply. You weren't in a position in this Committee to say, to evaluate the very idea of whether running facilities parallel down a corridor was a good or a bad idea. You were looking for suitable areas in the Mackenzie Valley to locate a corridor, should one be placed

Zoltai & Peterson
CrossExam by Bayly

1 there.

2 A I guess I still have some
3 trouble making the distinction between what you're asking.

4 Q I can make it into two
5 questions. First of all, did you, when you were con-
6 fronted with this question of corridor, did you say,
7 "What's a corridor and does it really make sense to
8 run an oil and gas pipeline down the same corridor?"

9 A O.K. Well, in answer
10 to that, that question was certainly debated but I think
11 I'm correct in saying that there was not research
12 specifically designed to answer that question. I do
13 think, though, that the acknowledgment of that, as a
14 good question, was one of the reasons why the 1972 guide-
15 lines asked the applicant for the first pipeline to
16 indicate the suitability of their proposed route for
17 a subsequent pipeline of the other type. If the first
18 applicant was a gas pipeline, we felt at the time that
19 that first application could be more properly assessed
20 if we had some indication of the suitability of that
21 route for an oil pipeline. So the question you raised
22 was acknowledged and recognized. I think I'm right in
23 saying, though, that government did not do specific
24 corridor type of research. Many of the studies, I think,
25 that were done would help answer the question but
26 researching was not specifically designed in that way.

27 Q All right, and I gather
28 that from your position on the Committee it was difficult
29 to tell whether the corridor concept as it relates to
30 the Mackenzie Valley was generated either in industry

Zoltai & Peterson
Cross-Exam by Bayly

1 or government, and whether there were studies before
2 yours that indicated whether it would be a good or
3 a bad idea to run the facilities parallel.
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1 A Yes, I don't know the
2 origin of the concept of corridor, whether it was
3 generated internally in government or in industry
4 or by joint meetings between them . I don't know
5 the origin.

6 Q Now, you say that the
7 issue of the corridor was debated in your committee
8 but that it wasn't studied in depth. Did you
9 evaluate the difficulty or the ease of studying
10 corridors in the abstract when you were on the
11 committee; is that why you opted for trying to get
12 the first applicant to discuss his route as it
13 would relate to another facility?

14 A Well, I guess one
15 thing I should point out is that the Environmental
16 Social Program, of which I was a part, made decisions
17 on allocations of funds by major subjects; but how
18 those funds were actually used for research in the
19 field were very much up to individual agencies that
20 received those funds and some of the more intensive
21 debates on the question that you just asked me
22 took place between myself and some of the project
23 leaders within Environment-Canada, agencies of
24 Environment Canada, and I think it generally came
25 to the conclusion that answers on whether a wide
26 corridor or a narrow corridor would be best for a
27 particular segment of the Mackenzie Valley usually
28 came to the conclusion that the answers would be
29 obtained only by experimentation, and perhaps
30 long-term experimentation, four or five years.

Zoltai, Peterson
Cross-Exam by Bayly

1 It was not possible to initiate such type of
2 experiments in the time frame of these studies so
3 that any discussions that could have helped answer
4 that were in the abstract rather than based on
5 experimental information and so then as an additional
6 safeguard, the applicant was invited to give
7 their opinions on the suitability of their route
8 or other facilities.

9 Q And you would be able
10 to look at an applicant's experimentation on a
11 particular route, I gather, or at least the government
12 would, to aid in determining whether or not placing
13 facilities close together at least in that area would
14 be a good or a bad idea?

15 A Well, ideally one
16 could have done that. The point is that the applicant
17 had a few test facilities from which you could get
18 some picture of the lateral spread, the lateral
19 definition of the zone of influence of that facility.
20 Government did not have any such experimental
21 facilities.

22 Q And when you were
23 discussing this I assume that you confronted the
24 difficulty that either the applicant or the government
25 would have had in assessing a route that you
26 were choosing for a chilled gas line and its suitability
27 as a route for a hot oil line?

28 A I am sorry, did you ask
29 did we recognize --?

30 Q Did you recognize

Zoltai, Peterson
Cross-Exam by Bayly

1 that as a limitation of the, say, ability of an
2 applicant to apply the experiments that they were
3 doing on one kind of a facility to another?

4 A Yes, I think it was
5 realized that there are some real differences between
6 an oil pipeline and a gas pipeline and that there
7 would be limitations on what could be said,
8 extrapolating from one to the other.

9 Q So would it be fair
10 to say that you were hoping for the experience of
11 the industry to be able to bridge this gap at least
12 to the extent of being able to do a preliminary
13 evaluation of their route as a possible corridor
14 for parallel facilities?

15 A I don't think that I would
16 say that the thought was that there had to be an
17 entire reliance on the industry. I think it was
18 realized that this would be, in terms of regional
19 planning and other kinds of planning for the
20 Mackenzie Valley, as stated in numerous government
21 reports and as stated numerous times in this
22 Inquiry, any one facility cannot be considered in
23 isolation. But I don't think that it was correct
24 to say that government was expecting industry to
25 provide in its application, all of the factors that
26 would need to be considered in things that ultimately
27 happened in the Mackenzie Valley. Many of the
28 government studies will, themselves, help to answer
29 that question if applied in a critical way.

30 Q Yes. Now, with regard

Zoltai, Peterson
Cross-Exam by Bayly

1 to the concept of corridor itself, did you attempt
2 to evaluate whether the idea of putting facilities
3 parallel to each other and close to each other
4 was a good scientific principle, or whether it was
5 really a principle based on not wanting to invade
6 large areas of wilderness with facilities?

7 A Well, I referred to
8 that briefly a few minutes ago and I would repeat
9 that there was not specific experimentation to
10 help answer that question. There was a fair amount
11 of debate, almost of the seminar type on that
12 question, and it is a very right topic for debate
13 because on the one side there are those who develop
14 very convincing arguments that a narrow corridor
15 that removes a minimum amount of land from its more
16 or less wilderness status is a good thing to achieve.
17 On the other hand, if it comes to questions of
18 disruption, if moose are migrating from the islands
19 of the Mackenzie, eastward from the river at
20 certain times of the year, I think it is a question
21 for research as to whether they are going to be
22 happier crossing three obstructions that are each
23 two miles apart or whether they would be happier
24 crossing three obstructions that are in a half mile
25 corridor, and it was debated, but it has not been
26 researched in any sophisticated way.

27 Q Now, I gather that
28 coming here as you do as a former member of the
29 government committee and as a person interested in
30 I.B.P. sites, that some of the assumptions that you

Zoltai, Peterson
Cross-Exam by Bayly

1 made on the Committee are things that people
2 choosing I.B.P. sites may not be happy with and
3 I refer you specifically to the Firth River
4 site that you referred to yesterday and the Old
5 Crow Flats. These are both sites that the I.B.P. people
6 would prefer to see not crossed by a pipeline or
7 related facilities, would I be correct in that?

Zoltai & Peterson
Cross-Exam by Bayly

1 A Yes, I said yesterday, it
2 is my understanding that if an application -- a detailed
3 application were now prepared for submittal to the
4 Minister of Indian & Northern Affairs, the scientists
5 who have proposed the Old Crow site and the Firth
6 River site would urge that^a/pipeline crossing those sites
7 would not be compatible with the intended purpose of
8 that ecological site.

9 Q All right. Now this wasn't
10 something, I gather, that the Environmental Social
11 Committee had the benefit of knowing when they not only
12 drew up their guidelines but contemplated the possibility
13 of crossing the Yukon with a pipeline.

14 A Yes, I would agree with
15 your statement that they didn't have the benefit of
16 that, and one might say that we, even today, lack specific
17 formal applications for those areas as ecological sites.
18 You might say that we don't have the benefit of it
19 today, except that I know what the intended purpose is,
20 and those who want to preserve those areas as ecological
21 sites.

22 Q Now you didn't ignore that
23 entirely because as I understand guideline 4, you were
24 contemplating areas that should be out of bounds to
25 pipelines and areas that restricted use should be made
26 of, although you weren't really pin-pointing any but
27 the possible exception of Campbell Hills at that time.
28 Is that correct?

29 A That's correct. That's one
30 of the reasons why guideline No. 4 was written, and I

Zoltai & Peterson
Cross-Exam by Bayly

1 suppose had there been an active and regular program
2 of submission of formal applications for I.B.P. sites
3 over the last four years, I'm sure the environmental
4 social program would have considered them very seriously
5 in the context of guideline No. 4. The fact is formal
6 applications have not been prepared and submitted for
7 those two I.B.P. sites.

8 Q Yes, and nonetheless this
9 principle being one that was recognized at that time,
10 was one that was meant to outline a policy and suggest
11 to applicants that they should avoid areas without
12 delineating what those were.

13 A I don't quite understand
14 the question, Mr. Bayly.

15 Q Well, an applicant without
16 knowing, without having sort of a power of clairvoyance
17 wouldn't be able to know necessarily when he decided on
18 the basic route he wanted to follow, that he'd have to
19 stay away from the Firth River or the Old Crow Flats.

20 A Lacking specific announce-
21 ments by government that say, "The following areas
22 are hereby declared out of bounds for pipeline construc-
23 tion," lacking those, and as I said yesterday they do
24 not, such reports do not exist, lacking those the
25 applicant wouldn't know; but as you are aware, the
26 applicants have carefully noted where the proposed
27 areas appear on maps and I think in many cases have
28 tried hard to avoid them.

29 Q Yes. Would you agree that
30 if these I.B.P. sites on the Firth River and the Old

Zoltai & Peterson
Cross-Exam by Bayly

1 Crow Flats became protected areas, that it's envisaged
2 by the people putting forward these sites that it would
3 make it very difficult to use either the coastal or the
4 interior routes to bring gas from Prudhoe Bay across
5 the Mackenzie?

6 A Well, as now proposed,
7 yes, it would be difficult. The scientists who are
8 proposing the Firth River site are saying that the
9 entire watershed is important to protect as a unit,
10 and that to be meaningful the I.B.P. site should extend
11 to the coast, the North Coast of ^{the} Yukon, and they are
12 also saying that pipelines and other related facilities
13 would not be compatible with their concept of that
14 class of ecological reserve.

15 Now, I think that's a matter
16 that has to be debated when formal applications are
17 prepared for that site. The same would apply to the
18 Old Crow site. At the present time the proposed bound-
19 aries which you can see on page 19 of the report
20 entitled:

21 "Ecological Sites in Sub-Arctic Canada,"
22 tabled yesterday, the proposed southern boundary of
23 the Old Crow site extends to the Porcupine River from
24 the Village of Old Crow eastward to the Driftwood River.
25 I suppose the question that has to be debated at some
26 point in time is whether that would be a -- would it be
27 as good an ecological site if its southern boundary
28 were north of Mount Schaefer, if it were north of the
29 proposed pipeline route through there, rather than coming
30 south of the Porcupine River. All I'm saying is that

Zoltai & Peterson
Cross-Exam by Bayly

1 that the present proposal now in published form is
2 in conflict with the proposed pipeline route.

3 Q And to avoid those as
4 the I.B.P. sites are presently proposed, would mean
5 either going the coastal route offshore, or perhaps
6 avoiding the interior altogether. I'm not saying
7 that that is going to happen or necessarily even that
8 it should happen, but in order to avoid these two
9 sites as they -- as the boundaries of them are now
10 drawn, that would have to be either done, or at least
11 seriously considered.

12 A If the government, if
13 someone were successful in convincing the Government
14 of Canada that these two sites should be established,
15 as boundaries are now shown in this publication, and
16 if it was accepted that they were not in the ^{class of} ecological
17 reserves that should have pipelines and other
18 facilities passing through them, then one would be
19 left with no alternative than the ones you suggested.

20 Q All right, and as these
21 sites are envisaged, they do not contemplate the
22 possibility of facilities going under the sites or
23 over them, they only contemplate the possibility of
24 facilities like pipelines going around them.

25 A Well, I don't want to go
26 too far on this point because formal applications have
27 not been made; but I have been advised by the scientists
28 involved with the proposed sites that in the applications
29 that they would prepare now they would urge that those
30 two sites, the Old Crow site and the Firth River site,

Zoltai & Peterson
Cross-Exam by Bayly

1 should not have facilities such as pipelines passing
2 through them.

3 So it means either a
4 debate as to whether the boundaries of their proposed
5 sites can be changed, if there must be pipelines pass-
6 ing through that area, or it means a search for alter-
7 nate pipeline routes.

8 Q With regard to the
9 proposals for these two sites, and from your knowledge
10 of them, do they exclude some of the activities that
11 native people are engaging in at the present time, such
12 as hunting, trapping, use of skidoos, fishing, etc.?

13 A I can't answer that
14 question with much confidence; but if you read the
15 accompanying description on page 18 of the report
16 entitled:

17 "I.B.P. Sites in Sub-Arctic Canada,"
18 one of the special features that is listed for that
19 site, and given as a reason why it should be set aside
20 as an I.B.P. site is the following -- I think I should
21 read the sentence. There is a discussion of its important
22 biological features, including its importance for
23 waterfowl, and then it says:

24 "But more importantly, it is an area suitable
25 for preservation for the study of the relationship
26 between game and furbearing animals and humans
27 who utilize them almost exclusively for their
28 livelihood."

29 And in my opinion that proposed site is a prime example
30 of the point I made yesterday wherein when I said that

Zoltai & Peterson
Cross-Exam by Bayly

1 the scientists who were proposing these northern I.B.P.
2 sites are assuming that man, especially native man,
3 is part of the ecosystem.
4

5 Q In other words, that he
6 would pursue activities that he has been pursuing,
7 in the case of hunting probably since he's been in the
8 area, and in the case of trapping at least since the
9 Hudson's Bay Company arrived.

10 A Yes, I'm quite sure I'm
11 speaking accurately for the other scientists who have
12 proposed this when I say that they never visualized
13 that the Old Crow people would be asked to leave the
14 Old Crow Basin, if it became an I.B.P. site.

15 Q Yes.

16 THE COMMISSIONER: Well, as I
17 understand it, Dr. Peterson, you said yesterday that
18 with respect to all of these sites, it was understood
19 that the native people made a natural contribution, so
20 to speak, to the ecosystem and that apart from wishing
21 to suggest that some consideration might be given to
22 bag limits or something like that, you didn't say that
23 that ought to be done but you suggested it might have
24 to be considered, that was the only limitation you
25 placed upon them, as I recall. Maybe I --
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Zoltai, Peterson
Cross-Exam by Bayly

1 A I agree with that, yes.

2 Q And has it been
3 discussed by the people who may be putting forward
4 either or both of the sites, the question of
5 renewable resource based industry, whether they
6 be, oh, perhaps, logging for log houses, if that
7 is applicable to any of the Old Crow area or things
8 of that nature which aren't necessarily being
9 done at present, but which perhaps would be - - I
10 don't know if they are compatible with the site
11 or not, that is what I really want to know.

12 A Well, again, I don't
13 think that I should try to answer that. Let me
14 just say that in the formal applications that have
15 been submitted to the Department of Indian and
16 Northern Affairs, and only seven out of 140 proposed
17 sites north of 60° have been done so far, the
18 I.B.P. panels are required to identify in their
19 application the competing, or the other interests
20 in the land that is part of the application. They
21 are also required to specify which of the other
22 land uses, be it the one that you asked about or
23 any other, which of those are compatible with the
24 intended uses of the I.B.P. site, and because
25 formal applications have not been prepared for
26 these two, I don't think I should speculate on
27 how these scientists would answer that specific
28 one. But if -- I will say one thing -- if they
29 are going to argue that industrial developments,
30 such as quarry sites and trunklines, pipeline

Zoltai, Peterson
Cross-Exam by Bayly

1 trunklines are not compatible with that proposed
2 site, I am sure that they would also argue that
3 commercial forestry operations would not be
4 compatible. But when it comes to the harvesting
5 of spruce trees to build a cabin, I think that is
6 very apt to be a different consideration. If the
7 argument is that man is part of the ecosystem, I
8 personally see no difference if the man takes a
9 tree from his environment to use it for shelter or
10 if he takes a muskrat to use it for a pelt or
11 food.

12 Q Yes. Now, in your
13 evidence, Dr. Peterson, you referred to the guidelines
14 as not being rules that are set down for companies
15 making proposals to comply with. They are
16 really a set of suggestions that should be followed,
17 and what really the company should look to as guidelines
18 that they have to adhere to, are those statutes,
19 ordinances and regulations that are presently in
20 force and would govern the placing and operating
21 of any facility in the various jurisdictions through
22 which it would pass.

23 A That isn't exactly the
24 point that I was trying to make, so I would like to
25 maybe correct the statement that you put to me.
26 I indicated that the 1972 pipeline guidelines were
27 not draft regulations on how to protect the environment,
28 and they were not even, in my opinion, suggestions or
29 what the applicant should do to protect the environment.
30 They were a checklist of subjects that the applicant

Zoltai, Peterson
Cross-Exam by Bayly

1 should include in their application for a gas
2 pipeline. In my opinion they are that, nothing
3 more, nothing less.

4 So, if that distinction
5 is clear, then I agree with the rest of your
6 statement, that the techniques by which the
7 environment is to be protected are to be found in
8 the applicable acts, ordinances and regulations.

9 Q All right. Now,
10 did the Environmental-Social Committee do an
11 evaluation of present legislation that would be
12 available to govern a facility like a pipeline to
13 see whether or not in their opinion that was adequate
14 or whether new rules and regulations would have
15 to be defined?

16 A I don't recall any
17 specific research on the subject. I once recall
18 a meeting where I, and I think other people from
19 their respective departments were asked to outline
20 to researchers who were working on the
21 Environmental Social Program, what were the
22 relevant statutes in our respective departments that
23 would relate to a pipeline, but that was by way
24 of review and I think I am right in saying there was
25 not specific research done to answer the question
26 that you have asked. /^Q So if this Inquiry wanted
27 to look into the adequacy or inadequacy of regulations
28 to facilitate building operations and maintenance,
29 they couldn't look to the Environmental-Social
30 Committee for the development of that aspect of this?

Zoltai, Peterson
Cross-Exam by Bayly

1 A I don't think that they
2 would find much of value in those reports.

3 Q All right. Now, you
4 did refer to the lack in Canada of an equivalent to
5 the National Environmental Policy Act that has been
6 enacted in the United States. Did the Committee
7 ^{Act} look at that in either developing the guidelines or
8 making a determination of whether to study legislation
9 or not?

10 A No, I don't recall
11 that happening. I personally was very interested in
12 what was happening in 1970 to '72 in that field in
13 the United States and I suppose that it influenced
14 some of the things that I did as a member of the
15 Environmental - Social Program, but there was not
16 a deliberate examination of NEPA in the
17 program.

18 Q Dr. Banfield in
19 his evidence referred to NEPA as the starting
20 point in terms of government formal involvement
21 ^{assessment} in the environmental/impact process, and would you
22 agree with that?

23 A Well, I assume that
24 he said that it was a starting point for Canadian
25 government involvement?

26 Can you rephrase your
27 question?

28 Q His evidence said that
29 the starting point, and he didn't refer to either
30 the United States or Canada, was the National

Zoltai, Peterson
Cross-exam by Bayly

1 Environmental Policy Act. I am assuming that
2 he was talkin g about the Canadian experience and
3 what they were looking at, but I don't know that
4 for certain.

5 A Well, in general I
6 guess I would agree with that statement. Maybe
7 we should give some credit to the people who had
8 the foresite to say in August 1970, in the first
9 guidelines, that the applicant for a gas or an oil
10 pipeline must submit a comprehensive report that
11 documents the expected environmental effects of the
12 project. August 1970 were quite early days. You
13 could tell me when NEPA came into force. Maybe
14 the author of the 1970 guidelines was a few months
15 ahead of NEPA, I don't know.

16 Q It appears to have
17 been drafted in 1969, when it was passed, I am
18 not certain. But in any event, those are almost
19 coincident experiences. It does not appear therefore
20 that the guidelines were built on the -- the '72
21 guidelines were built on the experience of looking
22 to the American National Environmental Policy Act,
23 and in particular Section 102 which deals with the
24 requirement there of having an environmental impact
25 assessment done for every major project.

26 A No, they were not and
27 that is why I stressed in my testimony that the work
28 of the Environmental-Social Program was not in
29 response to a specific application. Had the
30 NEPA approach been used, government would have called

1 for a filing of various preliminary information
2 by the applicant that would have described the
3 project in considerable detail and done the other
4 things that are required in section 102 of NEPA,
5 but that approach was not used.

6 Q Now, you have described
7 yourself as someone who is interested in this topic
8 quite apart from whether or not you were in a position
9 to study this with the Enviromental Social Program.
10 Have you evaluated the American experience with
11 this Act and would it form any suggestions or
12 recommendations that you would want to make to this
13 Inquiry with regard to ways of going about assessment
14 or whether recommendations should be made about
15 making rules and regulations in a similar fashion
16 to govern the building and operation of a pipeline?

17 A I don't think that I
18 can answer that question very intelligently without
19 giving it some thought. I can tell you that
20 my bias is against legislative, statutory requirement
21 for environmental impact statements. I know, as
22 you know, that the history of reports prepared under
23 NEPA in the United States has resulted in a great
24 many cases of relatively useless environmental impact
25 statements being written and I don't mean to ignore
26 its good points, but I think that I am biased against
27 a rigid statutory approach to that question.

28 Q What you are worried
29 about, I suggest to you is that applicants following
30 a statutory requirement do what we could call bare
compliance.

Zoltai, Peterson
Cross-Exam by Bayly

1 or formal compliance without going into the real
2 problems in depth. Satisfaction of the act becomes
3 an end in itself?

4 A Yes, and also the
5 subject of future court action.

6 Q Yes.

7 A In my opinion, some
8 good examples of relevant studies and inquiries that
9 make sure that the issues are brought before the
10 public in the end have a far more beneficial and
11 educational effect than legislation would have.
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Zoltai & Peterson
Cross-Exam by Bayly

1 Q Would you feel that
4 legislation would either have to be too rigid or too
3 general to cover each of many kinds of projects that
4 have to be assessed environmentally?

5 A Well, I don't know. I
6 haven't thought about it enough to answer the question.

7 THE COMMISSIONER: Well, in
8 the United States, Dr. Peterson, as I understand it,
9 under NEPA the fact is that these environmental statements
10 have been issued in draft and then in final form,
11 and that the suggestions they've made, regarding altera-
12 tions in each project, the questions they have asked,
13 the modifications they have proposed, in virtually every
14 case nothing has happened. That is what my understand-
15 ing is of the response by industry and government to
16 these environmental impact statements prepared under
17 NEPA. Is that your understanding?

18 A Yes, it is. In one of
19 my papers I've quoted a statistical analysis by
20 Kreith of the University of Colorado, which demonstrates
21 that very point, that the exercise of identifying
22 alternative actions turns out to be statistically, a
23 rather hollow exercise, and for various reasons the
24 alternatives end up being rejected in most cases.

25 THE COMMISSIONER:

26 Yes, I think I -- Kreith,
27 I thought it was Keith -- I think his studies showed
28 up to the time he carried it out there had been 40
29 projects assessed and virtually without exception they
30 had all gone ahead exactly as planned.

MR. BAYLY: Q Dr. Peterson, on

Zoltai & Peterson
Cross-Exam by Bayly

1 the subject of legislation, and just so that we clarify
2 this for the record, the point you were making is with
3 regard to legislation that deals with environmental
4 impact assessment requirements. You would agree with
5 me that legislation will and will be and is required
6 to look after and monitor the construction and operation
7 and maintenance of a facility like a pipeline.

8 A I don't think I agree
9 with that automatically. Again without giving it
10 thought I certainly know that -- and I'm certainly not
11 pretending to speak on behalf of government departments,
12 I can't do that, but I certainly know the feelings that
13 I think most people, most people involved in regulatory
14 agencies in government feel that there is legislation
15 you know, I think you find people very reluctant to
16 admit that there is legislation lacking to regulate
17 anything in the environment. But well, I really don't
18 think I can answer your question. Legislation, though,
19 of course, would or could simplify the regulatory and
20 implementation structures for a project as vast as the
21 Mackenzie Valley Pipeline, because lacking that
22 enabling legislation, I do foresee great problems in
23 who is out in the field making regulatory decisions,
24 what agencies are there and how many of them are
25 there. So I guess from an administrative point of view
26 it's very easy to muster some arguments for special
27 legislation of a regulatory nature for a project of
28 this kind.

29 Q All right.

30 A But I haven't given that

Zoltai & Peterson
Cross-Exam by Bavly

1 detailed thought.

2
3 Q And the Environmental
4 Social Committee didn't, I gather, look at -- I don't
5 mean the legislation -- but what organization of govern-
6 ment or whatever would be involved in monitoring
7 construction, operation and maintenance, whether it
8 would be a number of agencies or a single agency, or
9 whatever.

10 A No, there was not specific
11 research by the program on that. The question came up,
12 many times during meetings between members of the
13 environmental social program and the gas pipeline
14 consortium as to how might things be regulated. There
15 was debate and discussion on it; there was not research
16 on it. I would repeat that the environmental social
17 program was largely a data-gathering program and a
18 research program that tended to stay out of the affairs
19 of regulatory agencies.

20 Q Now you said that certain
21 discussions and debates went on. We've heard from
22 Mr. Horte that Arctic Gas, in any event, wants and
23 envisages a single authority, a super agency, if you
24 will, to look after the governmental regulatory respon-
25 sibility for the pipeline. Was that discussed at these
26 meetings and debates?

27 A Yes, I recall being at
28 at least one meeting where concern was expressed
29 by one of the gas pipeline applicants that their
30 concern was that they may have to deal with a dozen or
31 more different inspectors from a dozen or more different

Zoltai & Peterson
Cross- Exam by Bayly

1 agencies, and their question was whether there would be
2 any attempt to simplify that procedure in government.
3 It's a very real and understandable concern on the part
4 of the applicant , I think.

5 Q Have you given any thought
6 to this question of whether in the public interest a
7 single agency or a number of agencies would be more
8 appropriate? I'm not thinking now of the applicants'
9 interest because I think they have stated that quite
10 clearly, at least with regard to Arctic Gas, they want
11 a single agency.

12 A I thought about it to the
13 extent that I can think of two important rules. I think
14 one -- or objectives -- I think one objective would be
15 to have a mechanism that could take decisive action
16 without a long chain of command required. There is a
17 saying that someone has tried to establish a mathemati-
18 cal relationship between the geographic spread of an
19 oil spill and the number of phone calls that are
20 required to get action, on the contingency plan. That
21 problem should be avoided by having a decisive manage-
22 ment authority that can shut down the project if needed
23 for some reason. I think the other objective, though,
24 is to ensure that that decisive management authority
25 does in fact have the right kind of expertise backing
26 it up, which requires some form of input from a broader
27 base of specialty agencies. So I don't know how you
28 achieve a happy marriage between those two seemingly
29 divergent objectives.

Q All right. So as long as

Zoltai & Peterson
Cross-Exam by Bayly

1 you see the two things to satisfy are responsiveness
2 and expertise, and however those fit into a framework
3 as long as they're satisfied, those are the two main
4 objectives?

5 A Well, I think those are
6 two important objectives--

7 Q Yes.

8 A In my opinion.

9 Q Now, have you given any
10 thought to evaluating or methods of evaluating appropriate
11 environmental protection, either measures or legislation,
12 so that if this Inquiry is to make meaningful recommenda-
13 tions they can do so based on a knowledge of what the
14 problems are, and I think you've identified now two of
15 them in broad terms, the responsiveness and the expertise
16 problems.

17 A Well, I guess I've only
18 given it thought to the extent of bringing myself to
19 say what I did say in my testimony, and that is that
20 in my opinion we are not achieving an understanding of
21 what a project of this kind is going to mean, or how
22 it's going to meet environmental protection requirements,
23 unless we can compare the statements made by the appli-
24 cant against the requirements that are in the minds of
25 the regulatory officials, and that is why I took offence
26 to the implication that pieces of paper that have met
27 the 1972 guidelines should not, do not by implication
28 meet environmental protection requirements. The test of
29 that is whether the applicants' proposals can meet the
30 requirements that are in the minds of those who

Zoltai & Peterson
CrossExam by Bayly

1 administer the Migratory Birds Convention Act, and those
2 that administer the Territorial Game Ordinances and so
3 on down the line, and -- or as another example, those
4 who are thinking of national landmarks to be established
5 at various places in the Mackenzie Valley; it would
6 be nice to know exactly what they have in mind and
7 where their proposed boundaries are, and whether that
8 national landmark is compatible with a gravel pit at
9 its base, and those kinds of things -- that bridge I
10 do not see happening yet and that's the reason that I
11 made that point in my testimony.

12 Q Therefore it's unsafe for
13 us to assume that if the applicants or one of them
14 tells us, "We have complied with the guidelines," then
15 they haven't done anything more than respond to your
16 check list, the things that they should look at.

17 A That's the point I tried
18 to make.

19 Q I see. Now, if I can
20 turn now to you, Mr. Zoltai, with regard to the problem
21 you have suggested in fen areas, can you tell me whe-
22 ther in your opinion this dessication effect that you
23 referred to, would cause different vegetation either to
24 grow or to be encouraged on the upstream, as opposed to
25 the downstream side of the mound over the pipeline?

Zoltai, Peterson
Cross-Exam by Bayly

1 WITNESS ZOLTAI: Yes, if
2 there is an interception of natural drainage then
3 I can foresee a general increase ^{in the wetness} in the upstream
4 side and a decrease of wetness of the soil, in the
5 downstream side and this will result in differences
6 in vegetation on the downstream side which will
7 have perhaps less moisture. The tree growth will be
8 encouraged, perhaps, and the upstream side there may
9 be some ponding and then killing of the existing
10 vegetation until the new vegetation will be
11 established.

12 Q So you have raised
13 then the possible problem to consider that the
14 revegetation may take better on one side, on the
15 upstream side than the downstream side or vice
16 versa, depending on the species?

17 A I don't think that
18 the fens need to be revegetated. I don't see
19 revegetation as a problem on the right-of-way in the
20 fens.

21 Q In other areas, in
22 better drained areas, would you see this as a problem,
23 where the applicant proposes to cross a gentle slope,
24 for example.

25 A It may be a
26 problem because what happens when a berm is created, in
27 other words that the downslope seepage or drainage is
28 channeled through berms and then perhaps dispersed after
29 it crosses the pipeline. This means that some of
30 the moisture that has been intercepted

Zoltai, Peterson
Cross- Exam by Bayly

1 will be channeled and will not reach the area below
2 --downslope of the pipeline. Therefore, it will
3 receive less moisture than it has before. So this
4 may have some effect on plant growth.

5 Q Yes. Now, yesterday
6 in your evidence in cross-examination you were
7 referring to the crossing of fen areas where there is
8 the possibility of the creation of palsa effects?

9 A Right.

10 Q And did you consider
11 the problems when you are going from fen, immediately
12 to, say, rock, or to fine grained material, whether
13 these effects may be more dramatic in the height and
14 the extent of the growth of the palsa?

15 A I don't see much
16 difference really. In other words I envisage a
17 frost bulb or frozen shell developing in the fen,
18 whether near the edge of the fen or in the middle
19 of the fen.

20 Q All right, it won't
21 grow in the rock taking the far extreme example, and
22 it may grow more slowly or to a smaller extent if
23 you have a small fen and you go from that to a
24 sandy or gravelly area at the edge of the fen, do
25 you agree with that?

26 A It depends on the
27 moisture conditions in the fen. It may be a very
28 small fen in terms of crossing by pipeline. It may
29 be just a few tens of feet. But it can develop the
30 same frozen shell.

Zoltai, Peterson
CROSS-Exam by Bayly

Q Yes,

A But of course, once you have crossed an unfrozen material the problems become quite different because you have less moisture available for ice segregation.

Q All right, and so if, and I realize that you aren't a person who has studied this from a geotechnical point of view, but if you are crossing a small fen, you may have this frost bulb effect or palsa effect that you have described and it may put stresses on the pipe that do not occur at the edge of the fen, if it goes through rock, or, say, gravel?

A There may be stresses, yes, right.

Q The palsa, I gather depends on the kind of -- depends on the fen for its growth. You have got to have the moisture, a lot of moisture. You have got to have the top growth creating sphagnum and so it is only compatible with the fen terrain?

A Under natural conditions, I explained in my testimony how palsas are formed and this is where the microclimatic changes due to vegetation, comes to forth. This is correct. But for the so-called artificial palsa formation you simply need a great deal of water in this very wet unfrozen peatland .

Q And introducing that amount of water plus a frozen pipe might have the

Zoltai, Peterson
Cross-Exam by Bayly

1 same effect without the necessity of having the
2 particular soil conditions that you have described?
3 In other words you might get your palsa frost bulb
4 at the edge of the fen and it might take in more than
5 the fen area just because the pipe is what has
6 changed the microclimatic conditions?

7 A Yes, I think that I
8 also explained that under natural conditions, palsas
9 are usually formed in silt sized materials

10 Q Yes. Now, you are a
11 forester, Mr. Zoltai, as I understand, who has studied
12 the delta area. You referred in your evidence to
13 areas in which, in the delta, if you cut down the
14 trees they won't come back. Somthing else will come
15 back under those conditions, willow or whatever it
16 may be, and can you comment from your own knowledge
17 on the proposal that has been made by the producers
18 to cut some 8,000 pilings from the Fort McPherson
19 area for use in building gas processing plants. Is
20 that an area where we should be concerned about a
21 resource that on the face of it is renewable that
22 won't be renewed, at least in the future that we
23 can appreciate?

24 A I think that this is
25 a valid concern. The only large enough timber in the
26 area that I am aware of, grows in what we call
27 alluvial sites. These are riverine or floodplain
28 conditions and this is where large white spruce
29 grows. Now, we know from looking at the ages of these
30 trees, some of these trees are very, very old. I

1 personally have seen several that are over 350
2 years old and I understand from the literature that
3 some, up to 500-year old trees have been found, which
4 means that it takes a very, very long time to grow
5 trees of that size in that particular area.

6 Q What diameter would
7 a tree trunk at the base have at that age, approx-
8 imately?

9 A At the base it may
10 reach 16", 15"-16", but of course it tapers off
11 very rapidly, it is very short trees that we are
12 talking about.

13 Q Yes.

14 A So this is one aspect,
15 the extreme length of time that it takes to grow those
16 trees, and the second aspect is that after cutting
17 them the regrowth of the same species will be
18 extremely slow, simply because the ecology of the
19 area is such that after opening up a fairly well
20 closed white spruce forest, you get these various
21 shrubs, as you mentioned, coming in, and which in
22 turn may prevent the growth of the white spruce
23 seedlings.

24 Q So they may shade
25 them out, in other words?

26 A It may take hundreds
27 of years. I am aware of some literature in which
28 a cut over area has been examined and the area
29 turned into what can be described as a tundra area,
30 an area with shrubs and lichens, in other words, a

Zoltai, Peterson
Cross-Exam by Bayly

1 complete lack of trees. So, again, as a guess, it
2 probably will take hundreds of years before the
3 next generation of white spruce will come in.

4 Q All right, and this
5 wouldn't be the case I understand if one were to
6 get these pilings, from, say, the Fort Simpson
7 or say the Fort Liard area.

8 A That is an entirely
9 different situation down south.

10 Q Yes, and I gather that
11 if you had a tree there with a 16" butt at the base,
12 that it would probably be a taller tree and it
13 would be very unlikely for it to be 350 years old?

14 A I believe this to
15 be correct and you may even get more than one pile
16 out of a single log.

17 Q Yes.

18 Now, I understand, Mr.
19 Zoltai, that you had occasion to be on a committee
20 that went to Alaska to inspect the Alyeska project
21 as it was being built, is that correct?

22 A Well, we had a meeting
23 with more or less our counterparts in Alaska, both
24 federal and state agencies, and we had an occasion
25 to see a portion of the pipeline that was just then
26 being built in the Tanana Valley.

27 Q From the point of
28 view of the concerns that you have expressed before
29 this Inquiry, are there things that we can learn from
30 the Alaskan experience, things that they are doing

Zoltai, Peterson
Cross-Exam by Bayly

1 well or things that are not going so well?

2 A I think we could
3 learn a great deal from the Alaskan experience.
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Zoltai & Peterson
Cross-Exam by Bayly

Q What did you see there, can you give us some examples of the things you saw there that might be concerns that this Inquiry should make recommendations about?

A In my own experience it was an eye-opener to see what can be done from the engineering point of view. I certainly did not have the knowledge to visualize just what engineers can accomplish, and in this case, for example, in Alaska the ease with which they can go under in the ground where there is no permafrost and they can come up as soon as they hit a sensitive permafrost area, so it's quite an experience because I didn't think that this could be achieved as readily as they appeared to.

Secondly, that they were using steel poles, and this is in connection with your last question, the hollow pipes they used for supports. So again an alternative for wooden piles could be steel pipes.

Q And did you have a look at the way they had done their terrain typing and can you compare it with that done by the applicants before this Inquiry?

A No, I had no occasion to do that.

MR. BAYLY: Those are all the questions I have, Mr. Commissioner. Thank you, gentlemen.

THE COMMISSIONER: I think that completes the cross-examination of both witnesses,

Zoltai & Peterson
Cross-exam by Ryder

1 except Mr. Ryder.

2 MR. RYDER: I have a few
3 questions of Dr. Peterson.

4 THE COMMISSIONER: Do you want
5 to ask them now or after coffee?

6 MR. RYDER: Oh, I think after
7 coffee.

8 (PROCEEDINGS ADJOURNED FOR A FEW MINUTES)

9 (PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

10 THE COMMISSIONER: All right,
11 Mr. Ryder, you can ask your questions.

12
13 CROSS-EXAMINATION BY MR. RYDER:

14 Q Dr. Peterson, can I ask
15 you some questions that arise from page 9 of your
16 testimony and in your answer to question 9 on that
17 page you appear to be recommending that the identification
18 of sensitive areas or avoidance areas ought to be pro-
19 ceeded with, that function should be proceeded with,

20 WITNESS PETERSON: Yes, I am.

21 Q And that it should be
22 done as a formal activity of this Inquiry.

23 A I guess I didn't recommend
24 that specifically, but if this Inquiry is able to
25 take steps to see that those recommended excluded areas
26 and others perhaps more important than those, are
27 given some advance recognition or legal protection, yes,
28 then I would turn it into such a recommendation.

29 Q Well, I'm referring to
30 your suggestion that it be done by a joint effort between

Zoltai & Peterson
Cross-Exam by Ryder

professionals on the staff of this Inquiry and by experts in the appropriate agencies of government, that recommendation.

A Yes, that's how I visualize it would happen,

Q And some of the professionals on the staff of this Inquiry are concerned as to what may be involved in that task, and it might be useful because you have in your own work thought about this topic at length, it might be useful if you could give us some guidelines and some understanding as to what is involved. Now, can you give us some indication of the processes that are undergone in selecting these two sites, two kind of sites, particularly in view of your experience with the I.B.P. sites?

A Well, O.K., the two categories need to be kept separately, and I suppose answered separately, so let's talk first about -- I'll talk first about some of the recommended areas for outright avoidance and I suppose I have more say about that than I do about the other class. I think all that I can do is outline briefly the procedure that has been followed in making formal application for some I.B.P. sites, and perhaps there will be something of use in that, relating that experience to you.

In preparing formal applications for seven proposed I.B.P. sites in the Yukon and in Northwest Territories, we were guided, in fact, partly by the application for a grant of right-of-way that Canadian Arctic Gas submitted as part of their appli-

Zoltai & Peterson
Cross-Exam by Ryder

1 cation. We were guided also by at least two meetings
2 with the Department of Indian -- with a committee within
3 the Department of Indian & Northern Affairs that is
4 chaired by Dr. Maurice Ruel, R-U-E-L is his surname,
5 where they advised the I.B.P. panels on the kinds of
6 information they sought in order for an inter-depart-
7 mental committee to make a decision on these proposed
8 sites, and maybe what I'll just do, in my testimony I
9 attached only the map and the first page or the part
10 of the application that included the metes and bounds
11 description. It might be useful to you if I simply
12 list the other headings that appear in those formal
13 applications, and I have listed those formal applications
14 as reports relied upon for my testimony

15 " The procedure that we followed
16 was to include, in addition to a geographic description,
17 that is a map and a metes and bounds description, we
18 were required to document the reasons for proposing
19 the site and incidentally I should add, Mr. Commissioner,
20 I'd be very pleased to table a full copy of any one
21 of these applications, if you think it would be useful,
22 but for the record I'll at least read the headings.

23 Q We'd appreciate that.

24 A Yes. We documented the
25 reasons for proposing the site, and the intended uses.
26 We tried to document the availability of alternative
27 sites comparable to the proposed site. We were re-
28 quested by the Department of Indian & Northern Affairs
29 to justify the proposed boundaries, and that incidentally
30 is not an easy thing to do. We were required to

Zoltai & Peterson
Cross-Exam by Ryder

1 list our understanding of the public interest in the
2 action requested, the public interest in the action
3 requested. We then described, listed briefly any formal
4 contacts that had been made with those other public
5 interests.

6 Q How did you ascertain a
7 public interest? Did you go into the communities
8 themselves that you were concerned about?

9 A There was a certain amount
10 of that. One of the former co-chairmen, Dr. Norman
11 Simmons, who was a co-chairman for panel 10, over the
12 years has had a great deal of informal contact at the
13 community level, but it was not done in a formal way.

14 We described the compatibility
15 of the proposed site with the public interest groups.
16 We briefly listed the requirements for development of
17 a management plan. We didn't prepare a management plan
18 for ~~the~~ proposed sites. We simply identified informa-
19 tion that would be required and other kinds of
20 requirements for development of the management plan,
21 and lastly we gave our suggestions on regulatory and
22 administrative considerations. For example, in the
23 case of the Campbell Lake-Dolomite Lake application
24 we recommended that that proposed site could be given
25 the status desired if it were established under the
26 Canada Wildlife Act. In other cases, we would suggest
27 that there might be a more appropriate form of legisla-
28 tion. Those are the general subjects that we tried to
29 address, and I think it's for others to judge whether
30 that is a satisfactory or an unduly cumbersome procedure
to be used for other areas.

Zoltai, Peterson,
Cross-Exam by Ryder

1 Q Well, what is your
2 state of documentation then with respect to the Old
3 Crow and the Firth River proposals?

4 A To the best of my
5 knowledge, the two panels concerned are not at this
6 moment preparing applications. I think they have
7 most of the necessary information to prepare
8 applications, but they have placed a higher priority
9 on other activities at the present time.

10 THE COMMISSIONER: Just
11 let me make sure that I understand you. You said
12 that the group has submitted seven proposed site
13 out of a hundred and --

14 A 140.

15 THE COMMISSIONER: 140 north
16 of 60° to the Department of Indian Affairs and
17 Northern Development. How many sites are there
18 along the route of the Arctic Gas pipeline and the
19 other pipeline, the Foothills pipeline which, as you
20 will see, has a leg that goes to Yellowknife and
21 in what state of preparation are they generally?

22 A May I take a minute
23 to --

24 THE COMMISSIONER: Yes.

25 A I would want to check
26 it more carefully, Mr. Commissioner, but I think
27 that I could say that there are thirteen proposed
28 sites either intersected by proposed routes in-
29 cluding the supply laterals in the Great Slave
30 Lake area, either intersected by proposed routes or

Zoltai, Peterson
Cross-Exam by Ryder

1 within, let us say, 20 miles, even probably 15 miles
2 of proposed routes, and therefore possibly within
3 the zone of influence for things such as gravel
4 extraction.

5 Now, of those, only three
6 have been formally proposed and those are attached
7 as appendices to my testimony: Willowlake, Campbell
8 Lake and Caribou Hills. As to the state -- well, none
9 of the others are being prepared as formal applications
10 now and I personally expect that a decision that will
11 have to be made very soon is whether this Inquiry
12 feels it would benefit from those, because the commit-
13 tees have to place priorities on where and when they
14 submit formal applications out of the 140.

15 MR. RYDER: Dealing with those
16 three, Dr. Peterson, what is the -- can you take them
17 one at a time and just outline, starting with the
18 Caribou Hill site, the kinds of interaction that you
19 perceive?

20 In other words, first of
21 all starting with the question, what is the Dolomite
22 lake or Campbell Lake site intended to protect? That
23 may be threatened by the pipeline activity?

24 A Okay, I assume you
25 are asking for a brief statement on what is the
26 interaction between the proposed site and the
27 proposed industrial activities. In the case of the
28 Campbell Lake, Dolomite Lake site, that area is intended
29 to protect primarily, nesting populations of falcons
30 and some unusual plant communities. The possible

Zoltai, Peterson
Cross-Exam by Ryder

1 interaction there is the possibility of future
2 industrial
3 expanded mining of aggregate for various/activities
4 and of course the interest of Inuvik people in that
5 as a recreational area, and some of those recreational
6 interests may in fact be compatible with that area as
7 a proposed site.

8 For the Caribou Hills --

9 Q Before you leave the
10 Campbell Lake, is that also, you say, I think in
11 page 9, that's proposed as a special area under
12 the Canada Wildlife Act?

13 A Yes, I would prefer,
14 Mr. Commissioner, if Dr. Novakowski could be
15 -- could address the Inquiry -- do you have a
16 comment, Mr. Anthony?

17 MR. ANTHONY: Dr. Peterson,
18 you can answer to the best of your ability and
19 Dr. Novakowski is here and if he wishes to add
20 something further to it I will invite him to do
21 so when he appears.

22 A Yes, my brief
23 answer would be that the proposed -- the Dolomite
24 Lake, Campbell Lake ecological site as proposed by
25 the I.B.P. panels coincides exactly by boundary with
26 the proposed Campbell Lake wildlife area as proposed
27 by officials within the Canadian Wildlife Service,
28 and my point is that if that area were established under
29 the Canada Wildlife Act as one of their protected
30 areas, that step would achieve what the I.B.P.
31 scientists have hoped for the last five years would

Zoltai, Peterson
Cross- Exam by Ryder

1 be achieved.

MR. RYDER:

2 Q I see. Now, just
3 so that we can have this point illustrated further,
4 can you do the same with the Caribou Hills site?

5 A I don't think so,
6 well, at least the Caribou Hills site has not been
7 proposed as a Canada Wildlife --

8 Q I appreciate that, but
9 can you discuss the interaction between the pipeline
10 and that site?

11 A Yes.

12 Q Why that site is
13 designated as a protected area or ought to be?

14 A Yes, just very briefly,
15 the main reasons that the caribou Hills site has
16 been proposed is that there are again unusual
17 occurrences that are unique, or in that part of the
18 Northwest Territories there are unique plant
19 communities on the southwest facing slopes of the
20 Caribou Hills. The adjacent islands, Harrison Island
21 and Williams Island on the delta, adjacent to the
22 hills, are areas that have already been subjected
23 to long-term scientific study, and incidentally I
24 didn't mention during my testimony that that is a
25 very important criterion for the selection of such
26 sites.

27 Areas in which the nation al-
28 ready has a considerable investment in the form
29 of past research effort are often very high priority
30 ecological sites simply to protect your research

Zoltai, Peterson
Cross-Exam by Ryder

1 investment and to be able to go back and do measure-
2 ments. So some of the islands and the west facing
3 slopes of the Caribou Hills are the important
4 parts of that proposed site.

5 The north end of the
6 proposed Caribou Hills site, which, I should add
7 as now proposed and as shown in Appendix E of
8 my testimony, the presently proposed boundaries
9 are different than the proposed boundaries on the
10 land use maps that appear on the wall behind me. So
11 I would urge you to look at the proposed boundaries
12 that have been filed with my testimony. The interaction
13 would take place especially at the north end where
14 the extreme northeastern corner of the proposed
15 site is traversed by two and a half miles of the
16 Canadian Arctic Gas delta alternative. The
17 crossing of Canadian Arctic Gas near Tununuk Point
18 cuts through two and a half miles of corner of the
19 reserve site as now proposed.

20 In addition the Department
21 of Indian and Northern Affairs has made it known
22 that it is very -- it very much wants to ensure
23 that the gravel deposits, especially at the north
24 end of the proposed site are available for public
25 works or industrial use. So the interaction would
26 be at the north end of the proposed site where
27 gravel extraction and perhaps intersection by a couple
28 of miles of pipeline would take place within that
29 proposed site, and that is not viewed as being in-
30 compatible with the intended purposes of that site,
because the highly protected areas are further south

Zoltai, Peterson
Cross-Exam by Ryder

1 and on the islands.

2 Q Hasn't the Brackett
3 Lake or the Willowlake site been -- the boundaries
4 of that site, have they not been amended as well?

5 A Yes, they have. If
6 you compare the map that is shown in Appendix D
7 of my testimony, which is the map taken from the
8 formal application to the Minister of Indian and
9 Northern Affairs, the major amendment which
10 differs from the boundaries shown on the land use
11 maps here on the wall, is that a monitoring area
12 has been added at its southwest corner, in a location
13 that would intersected by the two proposed pipeline
14 routes and by a highway. That is the major change.
15 There have been some small boundary changes around
16 the wetlands, but that is the major change.

17 Q So that is a deliberate
18 interaction that you --

19 A That was a deliberate
20 attempt to try to establish the principle that one
21 important purpose of certain kinds of ecologic
22 reserves is for them to serve as monitoring sites
23 for disturbance with an adjacent undisturbed
24 area for comparison.

25 Q Now, turning to page 15 of
26 your evidence, you list some 11 odd areas that have
27 not as yet been formally submitted to the government
28 for consideration, and of these, as I understand it,
29 four come into contact with the Arctic Gas route.
30 Perhaps not direct contact --

Zoltai, Peterson
Cross-Exam by Ryder

1 A The Old Crow basin,
2 the Firth River site, the Rat River site and the
3 Ebbutt Hills site are intersected by Canadian
4 Arctic Gas route proposals.
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Zoltai & Peterson
Cross-Exam by Ryder

1 Q Yes. You mean with the
2 Rat River and the Ebbutt Hill sites, I take it that
3 those are sites where you feel that appropriate zoning
4 could permit the accommodation of the site with pipe-
5 line development.

6 A Yes, that is correct. I
7 should add, if I may add, the panel scientists happened
8 to place a low priority on the Ebbutt Hills site in
9 view of its -- the availability of similar -- the Ebbutt
10 Hills site does represent an ecosystem that could be
11 sampled. There are alternative sites available, if it
12 came to a land use conflict in this case. Alternatively,
13 it could be handled by appropriate zoning.

14 Q Now, dealing with the Old
15 Crow and the Firth sites, these are recommended for
16 outright avoidance, and they do lie across, one the
17 interior route and one the coastal route of Arctic
18 Gas' proposed lines. I wonder if you can tell us if
19 either of these two sites, were ever discussed in
20 terms of placing them in the restriction category as
21 opposed to the avoidance category?

22 A I'm not aware that that
23 has been discussed in any detail. My understanding,
24 which I have already stated, is that the present
25 thinking of the I.B.P. scientists would be that they
26 should be in the category of outright avoidance.

27 Q When you select them, when
28 your group selects an area to be a site of this kind,
29 surely one of the decisions that it has to make is
30 which category of protection does it fall into? Does

Zoltai & Peterson
Cross Exam by Ryder

1 it fall into the category of special protection measures?
2 Does it fall into the category of an avoidance area?
3 Would that discussion not take place with respect to
4 all of your sites?

5 A It hasn't taken place with
6 respect to all of the sites because I suppose I need to
7 repeat that this effort is done as a volunteer effort
8 by interested scientists. They do what they can in the
9 time they have available, and it's one of the reasons
10 why only seven out of a possible 140 applications have
11 been prepared; and no one would argue with the value
12 of doing the very thing that you have suggested, but
13 the point is it's not done until a formal application
14 is prepared, and it hasn't been systematically done
15 for each of the 140 sites in Northern Canada. It
16 will be done when applications are prepared because
17 one of the headings that must be addressed in the
18 application is the compatibility of the intended purpose
19 of the site and other land uses in the area.

20 Another question that comes in
21 is whether the proposed boundaries are in fact justified
22 because one way, of course, to avoid resource -- land
23 use conflicts is to adjust the boundaries. That is the
24 other debate that enters in when a formal application
25 is prepared.

26 Q Is it fair to ask you
27 which of these two sites has the highest priority?

28 A You can ask me and I don't
29 think I can give an answer except that my expectation
30 is that they would both be submitted at the same time

Zoltai & Peterson
Cross-Exam by Ryder

1 in the next set of applications by the panels, and the
2 panels would not place one above the other. They would
3 argue that they are both very high priority sites.
4 That's my feeling.

5 Q Do you expect these
6 proposals to be crystalized, and when? They may be
7 useful to put into the hamper of considerations that
8 the Inquiry will have to make with respect to these
9 two proposed routes.

10 A I realize that, and it's
11 for that reason I have been very pleased to have had
12 the opportunity to discuss I.B.P. sites at this Inquiry.
13 The department, the first reaction, the committee,
14 the Inter-Departmental and in fact ^{inter-} Governmen tal Comm-
15 ittee involving the Territorial Government, that is
16 now considering these first seven applications, have
17 made their first response to the two panels and have
18 said to the panels, panels 9 and 10, I.B.P. panels,
19 that to make decisions on any of these sites, the
20 governmental committee must have an understanding of the
21 priorities and the representativeness of all 140 sites
22 in Northern Canada, and that task has now been thrown
23 into the laps of the panels. If they take that up as
24 an activity, I think that's what's going to happen
25 first, or in place of the preparation of any formal
26 applications. I think within the next six months there
27 will be some more applications prepared, but the first
28 step that has to be done is for the panels to give some
29 priorities on a rating of the total 140.

30 Q Finally on page 16 of your

Zoltai & Peterson
Cross-Exam by Ryder

1 evidence, you note some of these -- you refer to sites
2 that may interact with the Foothill laterals that are
3 being proposed. Do you know whether there's any inter-
4 action, are you able to tell us about any inter-action
5 between those laterals and the proposal for sites?

6 A Well, only one. The ones
7 I have listed on page 16 are in the vicinity of the
8 proposed laterals. The Hart Lake site, site No. 79,
9 as described in the booklet,

10 "I.B.P. Ecological Sites in Sub-Arctic Canada,"
11 is intersected by the supply lateral that passes on the
12 north side of the highway near Hart Lake.

13 Q And is that intersection
14 a good thing or a bad thing, or something to be
15 concerned about?

16 A I'm reluctant to give
17 an opinion on that because I haven't discussed it with
18 the scientists who have proposed that site. My feeling
19 is, I can say this, that one of the special features --
20 there are two special features in that proposed site.
21 One is the presence of the Hart Lake Field Station,
22 which is a site of long-term biological study, and it's
23 proposed for the same reasons that Harrison and
24 William Islands are proposed in the delta; and secondly,
25 there are special ecological conditions in the cliffs
26 of the escarpment near the highway, and quite obviously
27 a pipeline disrupting, pipeline activities disrupting
28 any two of those activities would not be compatible
29 with the intended purpose of the site.

30 But further down towards the

Zoltai & Peterson
Cross-Exam by Ryder

1 lake a pipeline route may in fact be compatible, but I
2 would want to discuss that with the scientists who have
3 proposed the site.

4 Q One of the purposes of
5 one category of your sites is that they create areas
6 of continued monitoring between the inter-action of
7 and development on the other,
8 nature on the one hand/and I take it that your
9 proposal on page 15 is that the pipeline company should
10 bear some responsibility with respect to this. The
11 Caribou Hills, the Willowlake, and the ecological
12 sites for example. I can refer you to the second para-
13 graph on page 15, where you urge that the Inquiry recom-
14 mend the establishment of the Willow Lake site, as
15 proposed by I.B.P. panel 10, with particular
16 emphasis on the monitoring area in the south-west portion
17 of the proposed site. Now, in making recommendations
18 about these -- that monitoring area and the monitoring
19 area described in the next paragraph, that is the
20 Caribou Hills ecological site, do you have any ideas
21 that you can provide us with respect to the specific
22 purposes to be achieved by this monitoring? Is it a
23 case of monitoring in general or is there some special
24 attribute of the site that you want attention directed
25 to?

26 A Well, I would try to
27 answer those one at a time. I believe that the
28 Caribou Hills ecological site has some special attri-
29 butes. For one thing, there is, I would say, an above
30 average amount of information available from hydrological
studies in Peter Lake, which is within the proposed

Zoltai & Peterson
 Cross-Exam by Ryder

1 site. There is more than -- there is an above average
 2 amount of background information available for the
 3 islands on the delta within the proposed site. There
 4 is quite a predictable possibility of gravel removal from
 5 the site, so that there is an opportunity there to
 6 do before and after studies in relation to gravel removal
 7 as it affects local hydrology, soil conditions, and
 8 vegetation response. So that I think those are the
 9 special attributes that could be monitored there.

10 As for the Willow Lake ecologi-
 11 cal site, the very fact that the proposed monitoring
 12 area is going to be intersected by proposed facilities
 13 again I think gives the opportunity to monitor long-
 14 term questions of stability of the right-of-way, perhaps
 15 revegetation, approaches to a river bank and so on. We're
 16 talking the monitoring area of the proposed Willow Lake
 17 site comes down to the north bank of the Great Bear River.
 18 So that there are those possibilities.

19 Let me add finally that I am
 20 not trying to argue that these two sites that have been
 21 proposed in their own right, quite a few years ago by
 22 I.B.P. scientists; I'm not necessarily arguing that those
 23 are the best places to monitor side effects of the project
 24 that we are discussing at this hearing. That's why I
 25 think a companion recommendation is to invite the
 26 applicants themselves to define where monitoring might
 27 best be done, providing it has with it an accompanying
 28 undisturbed control area. I think a program such as
 29 this reaches maturity only when a few other people and
 30 interests besides the I.B.P. scientists themselves start

Zoltai & Peterson
CrossExam by Ryder

1 to accept the concept and propose their own candidates.
2 That in fact has happened, if you allow me to use
3 British Columbia as an example, British Columbia has
4 its own ecological reserves legislation and for the
5 first few years only I.B.P. scientists were proposing
6 sites and getting into arguments about them with agen-
7 cies such as the Forest Service and others. Now as a
8 sign of maturity, in my opinion, the British Columbia
9 Forest Service is itself proposing ecological sites.

10 I would hope that we could
11 argue for the same principle here, for those who have
12 other interests in land might see the value of proposing
13 their own monitoring sites, which, if properly established
14 could become part of the national system of ecological
15 reserves.

Zoltai, Peterson
Cross-Exam by Ryder

1 Q Do you percieve a job
2 of collecting and recording this monitoring information
3 as a function for the pipeline companies or for
4 independent scientists or government people?

5 A Well, I think it is
6 going to happen both places. One of the reasons --
7 I can speculate that one of the reasons why one of
8 the applicants has in fact gone part way in this
9 direction by doing studies at Chick Lake and at
10 other bcations with the promise that they are going
11 to do follow up studies, obviously, the owner and
12 operator of such a facility has its own self-interest
13 in doing monitoring if for no other reason to keep
14 itself out of trouble, or attribute disturbances or
15 to help argue whether disturbances are attributable
16 to their project or to natural phenomena.

17 At the same time regulatory
18 agencies will have a requirement to do monitoring so
19 I really expect that we are going to see two
20 parties doing monitoring of siltation and various
21 other side effects of this project if it goes ahead.

22 Q Has the program prepared
23 a system for collecting and recording this information
24 that can be given to the pipeline companies?

25 A I don't understand your
26 question. Has who prepared?

27 Q Your program or your
28 former program prepared a system that pipeline com-
29 panies can follow and be guided by, to collect and
30 to record this information so that it is made avail-

I think that I should stress at this point that lest we put too much emphasis on the relationship between I.B.P. and the monitoring function for environmental protection; the only reason I.B.P. has any interest in monitoring, is that one of their fundamental objectives is to ensure that there is legal protection for a few representative pieces of the earth's service in which we can do long-term measurement of changes in the environment. The only objective that they seek to accomplish is to ensure that there are a few places where, if you put out instruments to record climatic changes or any other environmental changes, that the place where you locate your instruments is still going to be there in five years when you want to do re-measurements. That is all that they seek to accomplish. It is the legal protection of the piece of ground on which the studies are being located. Now how the actual monitoring is done, in my opinion, is the responsibility of regulatory agencies and I assume the owners and operators of the facility.

Q So you foresee that the objectives of the pipeline company will not be precisely equal to the objects that you have in mind for these things? --

A Perhaps not --

Q And that some kind of agreed upon system may be useful so that the

Zoltai, Peterson
Cross-Exam by Ryder

1 monitoring can achieve both functions?

2 A Yes, I agree that that
3 would be a desirable function, but I don't want
4 to leave the impression that the scientists involved
5 with I.B.P. have either any special expertise nor
6 any -- I was going to say "responsibility"- authority
7 to become deeply involved in the monitoring process
8 itself.

9 Q One last question
10 before we leave this area, and that is that you
11 said that one of your recommendations is that such
12 a site should be located in an area of continuous
13 permafrost and another in an area of discontinuous
14 permafrost --

15 A Yes, I did.

16 Q Now, beyond that,
17 do you have any guidance as to what we should be
18 looking at?

19 A Well, if there is
20 support for the concept of an ecological site in the
21 Caribou Hills and an ecological site in the Willowlake
22 area, with parts of those sites zoned for a monitoring
23 function, and parts of them zoned for outright
24 protection of natural environment, those two themselves
25 fall respectively within the continuous and discon-
26 tinuous permafrost zone. The Caribou Hills site is
27 in the Zone of continuous permafrost. The Willow
28 lake site is within the zone of discontinuous
29 permafrost.

30 As for other suggestions, I

Zoltai, Peterson
Cross-Exam by Ryder

1 think that is why it is important to invite the
2 applicant or the staff of this Inquiry for that matter
3 to recommend better or alternative sites, if they
4 wish, that would fall within the two major zones.

5 Q Can you not involve
6 the other participants in this task?

7 A Which other participants?

8 Q Well, for example,
9 CARC, for starters.

10 A Mr. Commissioner, I
11 expect that anyone provided with the budget to do
12 some of these things would be most willing to partici-
13 pate.

14 Q I shouldn't have
15 asked.

16 Let's go back, and then I
17 will be done, can we go back to the sensitive and
18 exclusive exclusion sites as opposed to the
19 I.B.P. sites. You were giving us some indication
20 as to what is involved in the selection and definition
21 of these sites which is apparent it is no mean task,
22 and I just wondered if you had anything to add to
23 that and I am particularly interested in your reply
24 that there is some social concern to be addressed in
25 the selection of these sites and I think Guideline
26 4 states that, and that -- do you have anything to add
27 to that? Is that an area where we may receive some
28 positive contribution from the participants here ?

29 A I don't think that I
30 have anything to add to that. I would hope that

Zoltai, Peterson
Cross-Exam by Ryder

1 people who are knowledgeable about areas that are of
2 special social concern would make recommendations to
3 this Inquiry similar to those that I have made on
4 the basis of environmental criteria, and also I
5 realize that I didn't answer your earlier question
6 as to a suggested technique or what to do with these
7 areas that are suggested, not necessarily as areas
8 for outright exclusion, but areas requiring special
9 attention -- special protection. Surely, this is the
10 finest example that we can find of the need for, to
11 find out what is the intent of those who have regula-
12 tory responsibility for these things. I have simply
13 listed a few examples from published evidence, of
14 areas that are important to protect the fishery
15 resource and when a panel of fisheries experts appears
16 before this Inquiry, I would think that your question
17 would be answered then as to what techniques they
18 proposed to give the special protection to those
19 areas.

20 MR. RYDER: Thank you,
21 Dr. Peterson, and we are obliged that you could come
22 and give you the benefit of your evidence.

23 THE COMMISSIONER: Any
24 re-examination, Mr. Anthony?

25 MR. ANTHONY: No re-examination,
26 Mr. Commissioner.

27 THE COMMISSIONER : Well,
28 thank you very much Dr. Peterson and Mr. Zoltai for
29 sharing with us your knowledge and experience and
30 I certainly have gained a great deal from what both

1 of you have said. I think that we should begin,
2 should we, Mr. Ryder, the evidence of the next
3 witness, Dr. Novakowski?

4 MR. RYDER: Yes.

5 THE COMMISSIONER: Yes,
6 thank you again, gentlemen.

7 (WITNESSES ASIDE)

8 MR. ANTHONY: Mr. Commissioner,
9 while he is organizing, I think that this is the
10 place usually where Mr. Scott announces that Dr.
11 Novakowski is a member of the Government of Canada --

12 MR. SCOTT: I had a notion to
13 do that.

14 MR. ANTHONY: I thought
15 that this would be the one time that I would get a
16 chance --

17 THE COMMISSIONER: I don't
18 think that he is a member of the Government of
19 Canada.

20 MR. ANTHONY: No.

21 MR. RYDER: Can we not
22 take it with respect to all government witnesses, but
23 in any event I do understand that Dr. Novakowski
24 falls into that category and that the views that
25 he expresses^{here}/are his own views and in no way form
26 a statement of government policy?

27 THE COMMISSIONER: Well, I
28 quite understand that and I think that that's not
29 going to create any difficulty.

30 MR. RYDER: It is our
version of Section 5 of the Canada Evidence Act.

1 MR. ANTHONY: Mr. Commissioner,
2 Dr. Novakowski is appearing before us to discuss
3 the question of rare and endangered species and
4 the other elements that form part of his evidence.

5
6 N.S. NOVAKOWSKI, sworn:

7 DIRECT EXAMINATION BY MR. ANTHONY:

8 Q Dr. Novakowski, I
9 wonder if we could start this morning, if you
10 would indicate to the Inquiry your educational
11 experience and your background relevant to the
12 subjects that you will be discussing with us.
13 For those who wish to follow that, that was in the
14 circulated evidence under Appendix E.

15 THE COMMISSIONER: Yes,
16 I have it. Go ahead, sir.

17 A Mr. Commissioner,
18 beginning with my educational qualifications, my
19 first degree was obtained at the University of
20 Alberta in 1950, in Chemistry. I should add that that
21 by no means makes me a chemist. Following the
22 graduation with a Master of Science degree at the
23 University of Saskatchewan in Limnology and Fisheries,
24 dealing primarily with Northern Saskatchewan lakes,
25 and finally a Doctor of Philosophy Degree at the
26 University of Saskatchewan in terrestrial ecology in
27 1965, dealing primarily with beaver populations.
28
29
30

The professional organizations, the American Society of Mammalogists, of which I am also the Canadian representative on the sub-committee of that Society which is dealing with the conservation of land mammals on the North American Continent. The Canadian Society of Environmental Biologists, which to put it in the proper context, is a combination of an older society which is classed as the Canadian Society of Wildlife and Fishery Biologists. The next, the Canadian Genetics Society, of which I am a charter member; and the Professional Institute of the Public Service of Canada, of which I am an associate member.

For positions held, that is permanent positions, with the then Department of Northern Affairs & National Resources, as a research assistant to the resident mammalogist at Fort Smith. Then following that, a stint with the Saskatchewan Department of Natural Resources as a fisheries biologist, and then subsequently as a biologist, research scientist, research manager, which is a progression with the Federal Department of Indian & Northern Affairs, and the Federal Department of the Environment. At the same time I was lecturing in wildlife management and terrestrial ecology at the University of Ottawa, which is one aspect of federal service, which is in fact encouraged by a research organization such as ours.

28 I don't think I should elaborate
29 at any length with the job-related committee positions
30 because that seems to be the bread and butter of many

N.S. Novakowski
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1 Civil Servants, cum ^{bureaucrats} they are committee men.

2 My present position is perhaps
3 difficult to define, as the co-ordinator of the Wildlife
4 Management Branch, Canadian Wildlife Service and respon-
5 sible for the co-ordination of national programs relating
6 to endangered species research under the Canada Wildlife
7 Act; co-operative research by agreement with the
8 provinces and the Territories, and National Parks
9 research, which is a long-standing condition with the
10 Canadian Wildlife Service.

11 Q Your northern experience,
12 as indicated on the second page, I believe you indicate
13 you have been a Canadian Wildlife Service biologist
14 in Mackenzie South, and the Wood Buffalo National Park ,
15 a Canadian Wildlife Service staff specialist, mammalogy
16 advisor on wildlife research and environmental impact
17 studies, on the Advisory Committee on Northern Develop-
18 ment, and the Canadian chairman of the Convention on
19 International Trade, and endangered species of wild
20 fauna and flora.

21 A Yes.

22 Q And are you also involved
23 from the government's side in the establishment of
24 I.B.P. sites?

25 A Yes, I think I
26 should put on record the official title first of all
27 of the committee, it's been called many things. It
28 is classed now as the Working Group on Proposed
29 I.B.P. Ecological Sites, and as the previous witness,
30 has stated, it is an inter-governmental committee because

N.S. Novakowski
In Chief

1 it involves the Yukon Territory and the Northwest
2 Territories, as well as other government departments,
3 although it is chaired and the principal agency is
4 the Department of Indian & Northern Affairs.

5 Q You've also provided with
6 your biographic note a list of publications and reports,
7 and you are the author or co-author of those reports
8 I've listed there.

9 A Yes, that is correct.

10 MR. ANTHONY: Mr. Commissioner,
11 the full biographical notes, the list of reports and
12 the statement of evidence I have left with Miss Hutchin-
13 son to be tabled as an exhibit before this Inquiry.

14 (QUALIFICATIONS, LIST OF REPORTS & EVIDENCE OF
15 N.S. NOVAKOWSKI MARKED EXHIBIT 372)

16 MR. ANTHONY: Q Dr. Novakowski,
17 would you then please commence your evidence and presen-
18 tation before this Inquiry?

19 A The following brief is
20 based on a number of assumptions, chief of these being
21 that previous witnesses and more particularly the expert
22 panels have covered this subject matter in some depth.
23 What follows is a review based on the broad environmental
24 implications of the construction of a pipeline or pipelines
25 through the Mackenzie Valley and elsewhere in the north,
26 in relation to the wildlife resources at hazard.

27 I am assuming also that the
28 construction of a pipeline of the magnitude proposed
29 is a special development project and cannot be treated
30 in the same way as a development project in a restricted

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1 locale. Therefore I expect that the pipeline construc-
2 tion phase will require special regulations relating
3 to the protection of wildlife as well as other resources
4 and it is in that area that I focus my attention.

5 In the past other large-scale
6 developments for example, the Dew Line sites, had to
7 follow certain guidelines for housekeeping around their
8 sites. In this respect, much of the Dew Line work
9 was already well under way before the guidelines were
10 even written. These regulations did not have the same
11 scope or impact as the present Territorial Land Use
12 Regulations. I am concerned that the present regulations
13 do not specifically relate to wildlife, and therefore
14 I believe that wildlife has to be treated separately.

15 I think it's fairly evident
16 at this point that there is a distinction between wildlife
17 and other resources in the Northwest Territories, in that
18 one is managed by the Northwest Territories Government
19 and the other by the Department of Indian & Northern
20 Affairs.

21 A multiplicity of other Acts and
22 regulatory bodies further complicates the safeguarding
23 of wildlife populations. Environment Canada's regulations
24 respecting migratory waterfowl and Territorial regulations
25 respecting game in both Territories are considered
26 pre-eminent. Beyond this, international agreements such
27 as the International Polar Bear Agreement, and the
28 Convention on International Trade in Endangered Species
29 of Wild Fauna & Flora also need to be considered as
30 these were signed and agreed upon in right of Canada.

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1 Each of these pertain to the management and conservation
2 or preservation of wildlife, but do not relate to the
3 control of human activity. Pipeline construction, it
4 is expected, would be of high intensity and of short
5 duration on a seasonal basis. Wildlife values involving
6 wildlife habitat would be at hazard in that period, and
7 I should add "and beyond".

8 Q Mr. Commissioner, the
9 International Polar Bear Agreement and the Convention
10 on International Trade in Endangered Species are both
11 tabled as part of the statement of evidence. They appear
12 as Appendix C-1 and Appendix "C".

13 A In response to issues
14 assigned to me by the Canadian Arctic Resources Committee
15 I have considered two of the issues -- pipeline impacts
16 on terrestrial and aquatic mammals, excluding big game,
17 and rare and endangered species and (b), furbearing
18 animal's, long-range conflicts with development of gas
19 and oil potential and their future management needs

20 both as related issues. Both of these are considered
21 together for they involve in almost all cases the same
22 species. As a result, the impact of the pipeline as
23 well as the impact of gas and oil exploration and
24 beneficiation are of equal importance. Future management
25 needs similarly apply to both types of developments.

26 Q Dr. Novakowski, before
27 proceeding, could you define how you're using the
28 term "rare and endangered species" and what you mean
29 by the use of this term?

30 A The definitions are part

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1 of the testimony in Appendix "A", and I should add that
2 this definition is not enshrined in stone and is subject
3 to variation, depending upon who is writing the defini-
4 tion. The designation of "rare and endangered species"
5 is a complex matter, especially since information on
6 populations, taxonomy, and distribution of the smaller
7 or rarer mammals is lacking. Rare species either
8 occupy an extremely restricted habitat or are low in
9 numbers. Endangered species, on the other hand, were
10 once either abundant or generally well-distributed
11 throughout Canada, and are now being threatened by
12 destruction of their habitat or by deliberate attempts
13 to eliminate them. Peripheral species have not been
14 classified because they are distributed on the periphery
15 of Canadian territory, and thus may appear rare to
16 Canadians.

17 Q Mr. Novakowski, would you
18 describe the potential impact as it relates to various
19 terrestrial species?

20 A Yes, I would, and I would
21 first refer to the fisher, the group under consideration
22 are those taken from both the Northwest Territories
23 Game Ordinance under their definition of "furbearer"
24 and the Yukon Territory Game Ordinance. The fisher,
25 the populations of fisher are nowhere abundantly distri-
26 buted in the Mackenzie system, being our boreal species
27 and by that I mean species that generally live in the
28 trees. They would be at risk from any large forest
29 fires that may occur as a result of development as well
30 as from increased trapping pressure produced by

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1 increase accessibility.

2 I took that to mean that forest
3 fires should be considered as a part of any transmission
4 line such as a pipeline for gas, taking this from a
5 member of the National Energy Board who says in fact
6 that though pipelines may rupture, people never hear
7 about them, and they do cause fires.

8 Fox populations, and in this
9 case I am referring to both the red fox in the boreal
10 forest and the white fox in the tundra, are not at
11 risk in the immediate areas of the pipeline corridor.
12 However, oil and gas exploration in such areas as
13 Banks Island definitely increases the risk for increased
14 hunting pressures. The human population on Banks Island
15 is almost entirely dependent on the white fox resource.
16 The implications of course also extend to the polar
17 bear, seal, white fox interaction on the coastline of
18 Banks Island, and the delicate relationship that exists
19 among those may become unstable if one component of
20 the inter-relationship is disturbed.

21 THE COMMISSIONER: Pausing there,
22 Dr. Novakowski, what is the inter-action-- I think I
23 know what it is but it would be better if you --

24 A The inter-action is that
25 if in fact the lemming population on Banks Island drops,
26 the white fox move to the flow edge and utilize seals
27 as carion, generally, because they're not big enough
28 to take a seal on their own, which are generally left
29 there by polar bear. So that there is no conflict. It's
30 a matter of a symbiotic relationship between the three.

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1 The lynx populations are
2 cycli~~d~~ and the down-turn in those populations can be
3 predicted with some accuracy. In the last few years the
4 lynx has become a desirable item in fur trade and their
5 fur price has skyrocketed, in the order of magnitude
6 that we are talking about, a lynx pelt may have gone
7 from 10 to \$16 five or six years ago; they are now paying
8 up to \$200 a pelt for some of the better lynx pelts.

9 Again the increased accessibility
10 produced by a pipeline corridor might risk a further
11 diminishing of the population when it is in the low
12 period of its cycle.

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1 The marten is unevenly
2 distributed and appears to be very vulnerable to
3 trapping pressure. It, along with the beaver, is
4 probably the major animal whose take has been
5 regulated from area to area on a seasonal basis
6 over a long period of time. Populations in the Anderson
7 River area as well as upstream along the Mackenzie
8 Valley are thus at some risk from numerous activities
9 or accidents relating to either oil and gas exploration
10 or pipeline development.

11 There is almost a 40-year
12 history that can be traced back through government
13 files of closures of certain areas for marten
14 protection, quota systems for the take of marten, so
15 that this is a very vulnerable species.

16 Wolverine. The wolverine
17 has never been abundant and almost invariably they
18 are taken as accidental catches from any trap set for
19 other species. When taken they are usually not
20 reported although the species is a legitimate
21 fur bearer under territorial ordinance for the simple
22 reason that the very limited take is used locally
23 and not traded.

24 I should make one qualifica-
25 tion and I am sorry that I passed it by, and that
26 is "trapped" may mean any number of devices, including
27 poisons.

28 Although no concerted
29 effort is made to take the wolverine, some provinces
30 are uneasy about numbers within those provinces and

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1 are prepared to take restrictive measures to protect
2 what they consider a rare species. The Northwest
3 Territories and the Yukon Territory may yet take
4 that approach some time in the future.

5 The smaller furbearers named
6 in both territories' game ordinances, such as the skunk,
7 squirrel and weasel, are usually found in the boreal
8 forest and as a result it is expected that forest
9 clearing operations for pipeline right-of-way as well
10 as for drilling sites and exploration would effectively
11 remove a certain increment of the population for
12 a long time. In economic terms, it would not be
13 significant, nor would it be significant in biological
14 terms. All of these species are presently under-
15 harvested.

16 Q Would you describe
17 the potential impacts on the aquatic species.

18 A Yes, with respect to the
19 beaver, the beaver has many characteristics including
20 the ability to pioneer a new habitat. This makes it
21 less susceptible to human disruption. In fact, this pion-
22 eering instinct may sometimes be the kiss of death
23 for the beaver where they may move into a very
24 unsuitable habitat and as a result, not thrive. At
25 the same time, the beaver is a mainstay of the trapping
26 industry. Abundant populations of beaver, although
27 unevenly distributed, are significant from the
28 Mackenzie Delta upstream to the 60th parallel.
29 Management needs to protect such populations would
30 place the developer on the "horns of a dilemma."
For example, there are grounds altitudinally, and this

1 would only relate to the Mackenzie Mountains, for
2 example, beyond which the beaver will not build
3 its lodge and the result is that those areas are
4 beaver free. However, if this limit were used as a
5 criteria for pipeline construction, all beaver
6 below and downstream of the pipeline would be subject
7 to the hazard of any accidental spill. This would
8 relate primarily to oil .

9 This hazard may not be
10 significant in relation to natural gas, but most
11 certainly is in relation to crude oil .

12 Muskrat populations, although
13 known to migrate at high density, are usually more
14 restricted to locale and are again mostly restricted
15 to a pond habitat rather than to a river or a
16 stream habitat such as beaver may be. Population
17 densities, particularly in the delta areas of the
18 total Mackenzie system, and in this I include the
19 Peace-Athabasca Delta, the Slave River Delta and the
20 Mackenzie River Delta, are high and vulnerable to
21 disruption. Such pond systems are usually in some
22 form of evolution from youth to senescence, with
23 senescence being old age, and any disruption would
24 hasten that process and destroy muskrat habitat.

25 With otter and mink, both
26 of these are classed as fine fur. The mink is more a-
27 bundant than the otter, and it should be added here
28 the mink also, of course, can be supplied from
29 alternate sources, as the mink ranching industry in
30 Canada is a very viable one. The otter can be found

1 in all the river systems draining into the Mackenzie.
2 It is, however, more favourably disposed towards the
3 streams and ponds of the Canadian Shield. The
4 mink is more universally distributed. As much
5 of their food is derived from the aquatic environment,
6 any changes in the water quality of the streams and
7 ponds would endanger the species. As both the
8 otter and mink are generally territorial, only local
9 populations would be at hazard.

10 I should add here that
11 all of the species are divided taxinomically into
12 much finer units than at the species level. In
13 other words, we are either talking about species,
14 sub-species, or isolated population segments which
15 have an isolated gene pool, and as such we can con-
16 sider, though the mink may be universally distributed
17 across Canada, and all the other species, these
18 subpopulations may be at hazard, and they are as
19 much interest to us as the total population.

20 Q What in your opinion
21 are the future needs for the fur bearers?

22 A The future management
23 needs for all fur bearers discussed should involve
24 a shift in social concepts as well as biological
25 ones. In this respect certain decisions need to
26 be made.

27 Underharvesting appears to
28 be the present rule and attempts to reach optimal
29 harves t of the species are being considered
30 by the territorial governments. This is one of the

1 major criteria of rational wildlife management, and
2 that is the harvesting of surplus populations. To
3 this end the territorial governments need encouragement
4 to increase incentives for the increased utilization
5 of fur bearers.

6 B), it is argumentative
7 and certainly a point for discussion, because it
8 has been discussed for a long time, whether employees
9 of a pipeline company, regardless of their ethnic
10 origin, or the fact that they may hold a general
11 hunting and trapping licence should have any rights
12 and privileges regarding the exploitation or
13 utilization of the fur bearer resource. To this
14 end, definitely delineating fur trapping areas
15 assigned to an individual trapper not so employed,
16 would give him the pre-eminent right to that
17 resource. This is only a suggestion which is based
18 again on rational wildlife management requirements and
19 given only from the standpoint of wildlife management
20 techniques. I think it should be part and parcel of
21 the management plan. I think it is fairly easy to
22 see with such a large number of people involved that
23 a chaotic situation could easily develop.

24 C) Many rehabilitation
25 schemes for aquatic fur bearers have been tried in
26 the Northwest Territories. Population recoveries
27 from such transplants have had limited success and
28 have not increased the take by the trapper. Such
29 plans, which are usually expensive, should not be
30 contemplated as an after the fact means of rehabilitation.

1 in disturbed areas. The incorporation of future
2 management needs as they relate to pipeline development
3 and oil and gas exploration are clearly applicable
4 to the pre-planning stage to avoid unnecessary
5 environmental disruptions and to lessen after the
6 fact monitoring and surveillance. I think that this
7 is self-evident.

8 THE COMMISSIONER: Excuse
9 me, Dr. Novakowski. We are going to adjourn now
10 for lunch, but two things. First of all, we will
11 adjourn till two as usual, but Mr. Ryder, I understand
12 that Dr. Novakowski wants to leave this evening, at
13 least I think that you told me that, somebody
14 told me that, so I wonder if Mr. Carter, Mr. Lutes,
15 Mr. Bayly and you would get together and just see
16 if you can't make a fair allocation of the time this
17 afternoon so that we can complete Dr. Novakowski's
18 testimony.

19 MR. RYDER: Can we ask
20 when Dr. Novakowski is leaving?

21 A When the 7:50 flight.

22 MR. RYDER: That gives us --

23
24 THE COMMISSIONER: One thing,
25 Dr. Novakowski, that you might just tell me something
26 about after lunch, you make a statement here that the
27 furbearers are largely underharvested. Now, at
28 some of the hearings that I have held around the
29 territories, the people have come forward and they
30 have said, well, the native people are already --

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In Chief

1 let me put it this way, the harvest of fish and
2 animals is not sufficient to support the growing
3 native population in the North. Now, no one
4 has divided this between fur bearers, that you
5 might trap for sale and meat and fish that you might
6 take for your own consumption. But the
7 argument has gone something like this, we are already
8 at the point where we are harvesting as many fur-
9 bearers and others as we can without depleting the
10 stock and so forth and so on, the corollary being
11 that the native people should welcome the pipeline
12 because this will give them a place to work and
13 earn money and so forth and so on. Without going
14 into the last half of that argument, I am interested
15 in what you have to say about the first half.

16 Could the area that we
17 are concerned with here support a larger population
18 of trappers than it does now, that is, people
19 who take fur bearers for sale and for trade and do
20 you know whether it could support a larger population
21 living off the land?

22 Well, you might think about
23 that and we will deal with that at 2 o'clock.

24 (PROCEEDINGS ADJOURNED TO 2 P.M.)
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In Chief

(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

THE COMMISSIONER: Well, we'll come to order then and carry on with Dr. Novakowski's evidence.

MR. ANTHONY; Mr. Commissioner, before we proceed, you will recall that you raised a question with Dr. Novakowski, I'd like him to respond to that first.

THE COMMISSIONER: Right, fine.

A There are many ramifications to your question, Mr. Commissioner, some of which are certainly outside my realm of expertise. However, the basis for my statement evolved around not only the social factors, the changes in trapping practices and so on but also on the basis of the basic productivity of the environment to produce fur, and we do have to the south of the 60th Parallel an axiomatic situation where those areas in relation to basic productivity that are classified, for example, there's No. 1 agricultural lands probably are also Class 1 wildlife lands for the production of either furbearers or other wildlife, and so that the productivity decreases as you go north. From the standpoint of harvesting these species, accessibility and people involved in trapping also decreases as you go farther north. Certainly the pattern of trapping and the trapping pressure exerted, particularly in what we now call frontier areas, are certainly -- that is far removed from settlements, for example -- are definitely under-harvested. There are many things that have

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In Chief

created this situation which I don't wish to delve into, but which I'm sure will be discussed later on.

Q Yes. Well, what about if you're able to discuss the matter, the question whether large mammals such as caribou and moose, which I think in terms of meat, are the animals most often killed by native peoples for food in the north, can you say anything as to whether they are under-harvested now, over-harvested, or at a point of balance, do you know?

A Well, the regional picture is very varied, Mr. Commissioner. This is why you can't take an overall view of the situation. For example, again farther to the south, regardless of higher productivity, there generally is a fairly uniform allocation percentagewise of the increment that can be taken by hunting, either for meat or for sport, which is in the North American average, about 18% of a particular population.

Q Per annum?

A Population per animals, species.

Q Yes.

A Whereas dealing with such things as caribou, for example, I think the percentage is very much closer to 5%.

Q Yes.

A So that you're cropping at a reduced level or a reduced increment.

THE COMMISSIONER: Right. Well very interesting, thank you.

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In Chief

1 MR. ANTHONY: Q Perhaps, Mr.
2 Novakowski, you can turn next and I'd like to ask you
3 what in your view are the potential impacts on grizzly
4 bear?

5 A Yes. So long as present
6 confusion in the taxonomy of the brown bear, that is
7 worldwide, exists, grizzly problems in the N.W.T. and
8 Y.T. must be handled on a sub-population or isolated
9 population segment basis.

10 THE COMMISSIONER: Excuse me,
11 Dr. Novakowski.

12 A Yes.

13 Q This is going to seem
14 really stupid, but what does "taxonomy" mean?

15 A It's the classification
16 of a particular organism, using in this case that
17 zacatomus linaen (?) system of a species, and a genus
18 species and sub-species, though sub-species isn't
19 involved.

20 Each such population is a
21 gene pool providing the genetic diversity necessary for
22 the overall health of the population. This is the
23 broad view, keeping in mind that the grizzly is mobile
24 and geographic barriers other than space are fewer in
25 Northern Northwest Territories and Yukon than further
26 south. Because of diverse food habits, as well as
27 diverse denning sites, conflicts would arise largely by
28 chance or by accidental or intention uses of attractants.
29 Conversely, the development of aversive techniques, and
30 as an example, the conditioning to a bad experience

D.D. Nowakowski
In Chief

1 such as producing intestinal diarrhea from the consump-
2 tion of honey or garbage laced with lithium chloride
3 might be useful in eliminating some of the conflicts.
4 This was a very important point with Alberta, the
5 Province of Alberta, and in the first year of course
6 they destroyed a large number of bears which produced
7 a real outcry in the press, and as a result they went
8 move to such techniques as this, which of course
9 doesn't kill the animal but trains them. From the
10 human standpoint a grizzly is a trophy animal and
11 grizzly encounters and conflicts should not be used
12 as an excuse to collect such trophies. Human encount-
13 ers with grizzly bears are well-documented, including
14 encounters in the barrens and more particularly the
15 Mountain National Parks where increased inter-action is
16 provided by a high tourist population trying to obtain
17 a high country wilderness experience.

18 Many of the parks have had
19 garbage grizzly bear problems, and constant surveillance
20 during the construction period and an active program to
21 reduce conflicts is a necessity in this case.
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Of all the potential conflicts between man and wildlife the grizzly and plar bear is the most significant but the probablity of death or injury from bears is probably a great deal lower than is likely from industrial, that is, construction accidents. The onus should thus be on authorities to protect the bear rather than to react to human fears from the "danger" caused by the presence of bears.

Q Would you identify and describe what in your ^{view} are the potential conflicts with rare and endangered species?

A Rare and endangered species in the Northwest Territories and the Yukon Territory have not been defined or listed by the territorial governments. For that matter, we do not have a national list. They have, however, listed some specific species for the Convention on International Trade in Endangered Species of Wild Fauna and FLora. The species discussed in this brief relate only to those listed species and cover only the more prominent representatives of the Classes Mammalia, that's the mammals, and Aves, the birds. What others may be so listed is merely conjectural at this point and is the prerogative of the involved territorial government.

In relation to those species and also in relation to the list of species and also in relation to what the Convention on International Trade in Endangered Species of Wild Fauna and Flora is

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1 about I have included in Appendix C-2 and C-3 of
2 this testimony, the drafts relating to it.

3 The federal role in
4 endangered species studies and rehabilitation devolves
5 from sections 9 and 13(b) of the Canada Wildlife
6 Act and implies co-operative efforts on the part of the
7 territorial governments and Environment Canada
8 for such endeavours. I have tabled as Appendix
9 B, a copy of the Canada Wildlife Act.

10 There is a widely accepted
11 implication developed from the concept of rare and
12 endangered species. This implication, one of in-
13 violate sanctity of the species concerned, is
14 probably the most critical one in the public's
15 mind, that a developer may encounter. I am saying
16 this advisedly for the simple reason that the
17 subject of endangered species, rare and endangered
18 species is an emotional issue and it is an issue
19 involved with all Canadians rather than specifically
20 for the Northwest Territories.

21 The following species are
22 described according to their current status and the
23 management needs appropriate to their situation.

24 The Peregrine falcon, the
25 two subspecies in Canada which are referable to
26 the world peregrine is endangered in Canada. The
27 exact abundance of the peregrine falcon over its
28 historic North American range has never been determined.
29 It is clear, however, by virtue of its predatory
30 nature, that it was never numerous.

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1 THE COMMISSIONER: What
2 did you say just before that? You said in relation
3 to the world population of -- what did you say --?

4 A Of the peregrine.
5 In other words, it is distributed world wide, but
6 these two particular subspecies are referable to
7 North America.

8 THE COMMISSIONER: And does
9 that mean that those two subspecies are found here
10 in North America --?

11 A Yes.

12 THE COMMISSIONER: Oh, I
13 see.

14 A In the recently
15 completed 1975 North American Peregrine Survey,
16 a decreasing population trend has been recorded for
17 both subspecies. Perhaps without using the more
18 arrogant designation of subspecies I could call them
19 both forms.

20 The only remaining viable
21 Canadian Peregrine population with the exception of
22 Peals falcon on the Pacific coast, are north
23 of the 60th parallel. Successful breeding pairs
24 of peregrines have been observed in the Campbell
25 Hills area, Old Crow-Porcupine River area, Yukon
26 River and Horton River areas. Beyond these peregrines
27 have been recorded on Banks Island, Ungava. Bay,
28 Thelon River and various sites along the arctic
29 coast and barrens from Coronation Gulf to Melville
30 Sound.

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1 In view of the fact that
2 the peregrine was at one time distributed throughout
3 North America, the Ungava population is all that
4 is left for all of eastern Canada, and in fact the
5 eastern seaboard of the United States.

6 The total recorded popu-
7 lations of the continental form, anatum, and the
8 tundra form, tundrius, is 100 in the former and 67 in
9 the latter.

10 There is a widely accepted
11 rule of thumb in relation to endangered species,
12 though it is by no means a number that is applicable
13 to all species, and that is if an animal population
14 drops to somewhere below 200 members and its
15 population distribution is less than five discreet
16 populations, the animal is definitely threatened
17 with distinction. As you can see the peregrine is
18 slightly below that.

19 Educated guesses suggest
20 that other peregrines may be found in remote, suitable
21 habitat, but that these possible birds would not
22 significantly contribute to the total viable
23 population .

24 The key to the survival
25 potential of the peregrines is maintenance of their
26 breeding habitat. Without this there is no hope
27 of maintaining a wild breeding stock of the species.
28 One of the most significant detrimental factors
29 affecting the wild peregrine population is that of
30 organochlorine pesticides. Monitoring programs have

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1 demonstrated a causal relationship between high
2 pesticide levels and poor hatching success. The
3 persistence of these compounds in the environment,
4 coupled with their insidious actions in birds of
5 prey, birds of prey being the top of the food chain,
6 suggest that they will continue to be a limiting
7 factor in the survival question of the peregrines.
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1 Another pressure brought to
2 bear on the peregrines, as on other falcons, is the
3 human sport of falconry. Although it is not sure that
4 the historical trapping of peregrines for falconry or
5 removal of eggs by eggers have affected the peregrine
6 population, it is clear that increased access to
7 peregrine nesting areas will increase the potential of
8 human predation on an already unstable bird population.
9 Extreme precautions will have to be taken to minimize
10 the potential of human interference in areas known to
11 be utilized by the peregrines.

12 In this case I refer directly
13 to very site specific areas, for the simple reason that
14 the best researchers that we have been able to find
15 on the continent, have yet to come up with an answer
16 as to why one nesting site is better than another.
17 There is no way to answer why in fact they will ignore
18 a very suitable alternate nesting site and go to their
19 old original one. So that management in this case means
20 the -- not the management, the protection of a large
21 area but of a very, very site specific area.

22 The Eskimo curlew, which is
23 extremely rare and to all intents and purposes is
24 extinct. There have been no recorded sightings of
25 the Eskimo curlew since 1963. There are no known indi-
26 viduals kept in captivity. The exact locations of the
27 Arctic breeding range and the South American wintering
28 range are unknown. The captive breeding potential of the
29 Eskimo curlew is also unknown.

Recent reliable but unconfirmed

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sight reports (up to 1972) of the species on its former breeding range in the Northern Mackenzie River Delta have been received. By this -- these reports come from areas centering around the Anderson River Delta and the Tuktoyaktuk Peninsula.

Because of the rarity of these species, these sporadic sightings provide some hope that the species may still exist although in extremely small numbers.

The future of the species is dependent upon finding the northern nesting and southern -- that is South American -- wintering ranges and subsequent protection of these areas. Pessimistically, time is not on the side of the Eskimo curlew. Currently extensive oil and gas drilling activities are ongoing over much of the suspected nesting area. It is possible that these activities have already irreparably damaged the habitat. The thrust for a pipeline would see extensive inter-connected collector pipelines built over the area and these, rather than the major delivery pipeline, will be of much greater consequence.

It would appear that the fate of the Eskimo curlew is already sealed.

The whooping crane, of all the rare and endangered species in North America the whooping crane, of course, has received the most publicity and over a long term the public involvement.

The whooping crane's plight is probably the best known of any rare and endangered species in Canada. The present North American population

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1 numbers about 50 wild and 20 captive birds.

2 Habitat destruction has been
3 the main cause of the whooping crane's decline. The
4 widespread marshland drainage and cultivation of the
5 prairie regions destroyed much of the whooping crane's
6 former summer nesting areas. Historically, numbers of
7 nest sites were observed in scattered areas of Saskatch-
8 ewan and the adjoining prairie provinces, but now the
9 only known nesting area is the Wood Buffalo National
10 Park in the Sass, Klewí, and Nyarling River areas.

11 The whooping crane is very selec-
12 tive in choosing its next site and does not readily
13 accommodate to man's interference, especially at cer-
14 tain critical nesting periods. Parents for instance,
15 have been inadvertently flushed from the nest by
16 experts, even exercising the utmost caution, involved
17 in whooping crane management programs.

18 In the past nesting season
19 (1975) 35 adult birds were observed in the Wood Buffalo
20 Park nesting areas. The area is known as the Sass River
21 nesting area. 32 of these were breeding pairs and pro-
22 duced 16 successful nests. 31 eggs were laid.

23 As part of a continuing co-
24 operative Canadian-U.S. program to boost the wild
25 population of whooping cranes, 14 of the 31 eggs were
26 removed (1 egg per nest, where possible) for incubation
27 by sandhill cranes on their nesting area at Grays Lake,
28 Idaho. The program of removing one egg stemmed from the
29 fact that usually the whooping crane laid two eggs,
30 and though they may have hatched the two eggs, only one

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1 appeared to survive out of the two. There might have
2 been a sibling strife involved, any number of things.
3 However, it was felt that taking one egg was not
4 reducing the population at best.

5 The hatching and rearing
6 successes at Wood Buffalo and Grays Lake are as follows:
7 The total eggs taken from Wood Buffalo were 17;
8 total eggs left in Wood Buffalo, sorry, were 17,
9 14 taken to Grays Lake. The number hatched in Wood
10 Buffalo, Wood Buffalo National Park, that is, was 11;
11 9 were hatched from the Grays Lake group.

12 The number which were observed
13 to have been lost due to predation is 3 in Wood Buffalo
14 National Park and 2 in Grays Lake.

15 The number infertile -- and
16 this happens also -- was 3 in Wood Buffalo National Park
17 and 3 in Grays Lake.

18 So that in total 9 were reared
19 in Wood Buffalo National Park; 6 were reared in Grays
20 Lake. The title which says "lost" should be "presumed
21 lost" in that they weren't seen over a long period of
22 time, two in Wood Buffalo National Park and 3 in Grays
23 Lake.

24 It is still too early to
25 determine the final survival figures for this years
26 brood as the annual migration to the southern wintering
27 areas is not yet completed.

28 There are signs of improved
29 success, however. From the Grays Lake sandhill fostering
30 program comes the earliest signs. Already one young

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1 whooper has arrived at the sandhills -- that is the
2 sandhill crane's New Mexico winter range, and 3 of
3 the remaining 5 have been spotted with their foster
4 parents at the customary sandhill crane stopover in
5 Southern Colorado. The other 2 are presumably on their
6 way too. In actual fact, the later statistics seemed
7 to indicate that the Aransas complement, the
8 complement at the Aransas Refuge is now complete
9 and in actual fact 48 adults arrived and 8 young
10 arrived, which is the highest total ever observed, I
11 think, something like -- well, I don't know. That
12 large a number has never been found there.

13 If the pattern of other years
14 holds, however, we cannot expect many of the young
15 Wood Buffalo National Park young to reach their winter-
16 ing range. In the past when anywhere from 6 to 15
17 eggs have hatched in the wild, no more than one or two
18 of the young survived to reach the Aransas Wildlife
19 Refuge in Texas. As I stated earlier, this year was
20 obviously an exception when eight out of the nine
21 observed as hatched showed up. The key to the surviv-
22 al of the whooping crane is the absolute preservation
23 of its wintering and nesting areas.

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In the U.S. a recent initiative to expand the protected winter range is underway. Matagorda Island, an island offshore from the Aransas Refuge has traditionally been utilized by the whoopers. In the past, the U.S. Air Force has used the island for bombing drills and consequently the island has not been an ideal whooping crane retreat. It is hoped that with the news that the Air Force has ceased to use the island, the island can soon be included in the Aransas Wildlife Refuge. I should state here that in all fairness to the Department of the Interior, in their management of the refuge, that in fact there is a public viewing within the refuge which means cars and people and also that there are oil derricks right within the Aransas Refuge. These are producing wells. They have managed to meet all of the environmental guidelines.

In Canada, the presently known nesting sites are protected within the boundaries of the Wood Buffalo National Park.

There is, however, one unexplained mystery. Each year a larger number of birds leave the Aransas Refuge than arrive in Wood Buffalo Park. Each year the total flock can be accounted for over the migratory route up to the areas in the Great Central Plains in Saskatchewan. But then only mature, breeding adults appear on the nesting grounds of Wood Buffalo Park. The subsequent whereabouts of the immature whoopers is a mystery.

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1 Searches over suspected suitable habitat areas
2 have never revealed the summer whereabouts of the
3 non-breeding birds, but then in the fall, just
4 as mysteriously, the "lost" individuals straggle
5 into the Sass River area on the first leg of
6 their southern migration.

7 THE COMMISSIONER: That
8 is in the park?

9 A Yes, in Wood Buffalo
10 Park. It is in Wood Buffalo Park and it is north,
11 but it is north of the 60th parallel. It is in the
12 Northwest Territories section of Wood Buffalo Park.

13 This indicates that there
14 are unidentified summer habitat areas utilized by
15 the immature whooping cranes. Whether these areas
16 are close to the traditional nesting areas or further
17 north is not known.

18 The preservation of the
19 northern Canadian nesting areas and an aggressive
20 search for the unknown support habitat utilized
21 by the non-breeding individuals is key to the future
22 perpetuation of the whooping crane.

23 Current attempts to augment
24 the wild population of whooping cranes by using
25 "foster parent" sandhill cranes, appear to be favoured
26 by success. As it takes about five years for young
27 whoopers to reach sexual maturity, the ultimate success
28 of the population management program will not be
29 known for at least another four years.

30 In the meantime, habitat

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1 maintenance for this rare and endangered species is
2 crucial. The reason this total program using the
3 foster parents of course is the question as to
4 whether the whooping cranes, the young whooping
5 cranes will imprint on their sandhill foster parents.
6 If they do, then of course the likely project is
7 that the animals will hybridize which of course
8 destroys the purity of the subspecies.

9 THE COMMISSIONER: Yes. Well,
10 you don't know what the answer to that is yet.

11 A No, it still is a
12 waiting game.

13 Wood Bison. Historically
14 abundant and now rare. The wood bison has been
15 designated as an endangered species for the purposes
16 of international trade and to all intents and purposes
17 within Canada also.

18 There are approximately 200
19 wood bison in Canada. Recent figures provided to
20 me indicate an increasing population and in fact the
21 population in the Mackenzie Bison Sanctuary might be
22 quite a bit higher than the 130 which I quoted.
23 The balance of the herd is held in the isolation in
24 area in Elk Island National Park and that numbers
25 approximately 70 animals. Agreements will soon
26 be in effect for further transplants in the Northwest
27 Territories, and that area from the west shore of
28 Great Slave Lake and south of Great Slave Lake to the
29 Mackenzie Mountains can all be classed as historical
30 range. As quite obvious, at least two and probably

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1 three of the proposals for a pipeline will transect the
2 historical range and some of those areas we will
3 certainly be having a look at.

4 The present boundaries of the
5 Mackenzie Bison Sanctuary do not appear to be close
6 to the proposed Arctic Gas Pipeline route. Little
7 conflict in this respect is anticipated.

8 However, the Foothills
9 supply lateral to Yellowknife and Pine Point, does
10 cross the western boundary. Conversely, also the
11 "East of the Franklins" alternative, that is --
12 could interfere with future suitable range for
13 expanded management range as the wood bison population
14 grows. This, I think, in all fairness would have to
15 also include the Horn Mountains or Horn Plateau.
16 Suitable wood bison habitat exists in the Horn Plateau
17 area. Pipeline alignment/around the identified
18 range would provide adequate protection for the
19 site. Furthermore, agriculture is well established in
20 the western part of the sanctuary so that the land is al-
21 ready alienated and restricts westward expansion.

22 Wolverine. The status of
23 the wolverine is that it is never really abundant. The
24 wolverine's distribution and population density has
25 never been well documented. A recent manuscript
26 provides the following data.

27 Hudson's Bay records from
28 1960 to 1972 show a total of 772 pelts traded
29 through their network in the 12 year period. Of this
number, 48 originated from the Northwest Territories

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1 and 278 from the Yukon Territory. Manitoba,
2 Saskatchewan and British Columbia provided most of
3 the balance of the wolverine pelts.

4 Another study also by
5 the same authors, Dagg and Campbell, 1974, in their
6 bibliographic review record varying numbers of
7 commercially harvested pelts from Alberta, British
8 Columbia and Northwest Territories from 1942 to
9 1972. In the 1950's over 100 pelts pelts per
10 year were recorded from the N.W.T. while in the
11 1960's and 1970's show annual harvest closer to
12 fifty or sixty. I think in that period also
13 the fur garment shop in Inuvik was operating which
14 might have something to do with the difference in
15 total.

16 The wolverine is apparently
17 not abundant even taking into account the fact that
18 most pelts are utilized in the local communities
19 and few reach the trader.

20 Little research on the
21 habits and the habitats of the wolverine have been
22 undertaken, However, a few generalizations, showing the
23 adaptability of the species can be made.

24 First, the wolverine is
25 primarily nocturnal by nature and as such, encounters
26 with man are likely to be minimal.

27 Second, the wolverine is
28 secretive in habit and wary of man, and few wolverine
29 sitings, except for trapped individuals have been
30 recorded.

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1 Third, the wolverine's
2 solitary habits increase its survival chances from
3 man's predatory habits. The only time family groups
4 are together is in the first three or four months
5 of young raising. Following this period, each
6 family member adopts the more customary solitary
7 habit.

8 In general it would appear
9 that human activities are of minimal importance
10 to the survival of the species.
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1 Grey wolf, which is threatened
2 in the United States, only some populations, sub-
3 populations can be considered threatened in Canada.
4 There are no published population numbers for the many
5 sub-species involved. The wolf is likely involved with
6 caribou herds along the pipeline route as well as
7 depredating on the reindeer herd within the Reindeer
8 Reserve.

9 The well-known Mackenzie
10 Valley wolf, and various intergrades from the east and
11 west, is distributed throughout the Southern Mackenzie
12 Valley, the taxonomy is more confused in Northern
13 Yukon and the delta. The wolf is classed as a game
14 animal and has a bounty payable to the hunter or trap-
15 per. The total taken under the bounty system averages
16 about 300-400 annually. At this level no effect on the
17 total population has been noticed.

18 I should add that a larger
19 number than this was taken during the wolf control
20 operations in the Northwest Territories in the 1950's
21 and the same effect obtained. In other words, there
22 was no noticeable effect upon the population.

23 The long-range view is that
24 wolves will congregate where certain ungulates congre-
25 gate in cutover rights-of-way. Wolves pose no threat to
26 human safety, but by being increasingly accessible an
27 increase in kills is likely.

28 From a societal point of view
29 any increased persecution of the wolf will raise the
30 level of public concern for the animal's welfare. In

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1 view of the recent films about the wolf and its northern
2 habitat, such a course seems inadvisable, and particu-
3 larly from the Canadian standpoint there are a number
4 of public bodies, public organizations, the major one
5 of these being the Wolf Defenders League, which strangely
6 enough, is located in Toronto, is a fairly large force
7 in influencing public opinion.

8 There is little doubt that some
9 species are now threatened. In certain areas continued
10 hunting may have to be curtailed. Hunting of wolves
11 by any group not licenced should be prohibited.

12 Now the polar bear is placed
13 with the en_dangered species for the simple reason that
14 the International Union for the Conservation of
15 Nature and Natural Resources, another international
16 body which is located in Switzerland, has declared the
17 polar bear as endangered in their red data book, and
18 this is an international listing of all endangered
19 species around the world.

20 Canada does not consider the
21 polar bear endangered species within Canada. The
22 Canadian populations of polar bears have been grouped
23 by the Federal-Provincial Polar Bear Technical Committee
24 into various management zones. This is in relation
25 to the setting up of polar bear quotas across the
26 Northwest Territories and those provinces which have
27 polar bears. Zone H, roughly extending from mid-
28 Victoria Island westward and parallelling the Arctic
29 coast to the Alaska border is the only zone of interest
30 for the current testimony.

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1 The total estimated polar
2 bear population in Zone H is between 1,000 and 1,500,
3 and our polar bear specialists state that if you hit
4 it somewhere in the middle it would be fairly close.
5 The total number of bears available for hunting during
6 the 1975-76 season by Inuits only is 66 in the North-
7 west Territories, and 6 in the Yukon Territory.

8 The allocation for the Yukon
9 is small because of the small Inuit population inhabit-
10 ing the coastal Yukon areas.

11 There is an interchange of
12 Alaska and Yukon populations of polar bears but no
13 management agreement has been worked out, although co-
14 operation in research is continuing as part of the
15 International Agreement on the Conservation of Polar
16 Bears, which I have tabled as Appendix "D" in my
17 evidence.

18 The International Agreement on
19 the Conservation of Polar Bears is a five-nation agree-
20 ment and thus far only two nations, Canada and Norway,
21 have ratified it.

22 THE COMMISSIONER: Q Dr. Nova-
23 kowski, you have classified some of these animals
24 as rare, endangered, threatened and so forth. What
25 about the polar bears, did you assign any designation
26 to them? Any classification?

27 A Well, the reason I stated
28 that they were -- I put them in with the endangered
29 species group in relation to the international or world-
30 wide picture on polar bears.

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Q Right.

A But obviously if Canadians, Inuits in this case, are to hunt polar bears they cannot be classed as an endangered specie. It's an inaccuratism which we have solved through the Canadian declaration of the agreement which is also in Annex "D".

In relation to the Northwest Territories and Yukon Territory quotas, a certain number may be allocated for sport hunting by the Commissioner of the Northwest Territories, if desired by those Inuit that have been allocated a quota. They can re-assign part of their quota for sport hunting. This is certainly a factor that might be involved in any pipeline development, as increased opportunities for a larger constituency of available sport hunters would be at hand.

As the major denning areas for Zone H are the west coast of Banks Island, the west coast of Victoria Island, and to a lesser extent the southern and northern coasts of Banks Island, encounters with polar bears inland on the mainland would be few. Present polar bear-man conflicts are usually offshore.

MR. ANTHONY: Q Dr. Novakowski, would you describe the current deliberations of the I.B.P. Site Committee that you identified earlier?

A Yes. The working group on proposed I.B.P. ecological sites met for the first time on November 14, 1975, to consider terms of reference and the functional responsibilities of working group members. The members are drawn from the Departments of

These are the three I.B.P. proposals described by Dr. Peterson in his evidence. The first two may be jeopardized by the pipeline alignment. The administrative mechanism for the management and withdrawal of these proposed areas is currently under review, and at this time it would be premature to speculate on the ultimate mechanism. It is the wish of the chairman, Dr. M.J. Ruel, assistant director, Northern Natural Resources & Environment Branch of the Department of Indian & Northern Affairs, that all discussions of such sites be co-ordinated through him and that this would in fact include public bodies. The total process for the examination of sites may involve many years of deliberations and it would be inadvisable at this time to ignore any site

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1 presently in the pathway of any of the proposed pipelines
2 or proposed exploration and exploitation sites.

3 In this relation also, because
4 of the fact that the priorities were set by panels 9
5 and 10, I think that placing all those I.B.P. sites
6 within the pathway or in the proximity of a pipeline
7 corridor or pipeline routes might be deemed by others
8 to be slightly opportunistic. This is, of course, the
9 choice that Dr. Ruel will have to make.

10 The following map identifies
11 the various sites identified by panels 9 and 10 in
12 the vicinity of the Arctic Gas Pipeline route. Further
13 atable identifies, in tabular form, the final high-
14 lights of the sites of relevance to all the proposed or
15 suggested pipelines, which are open to discussion.

16 MR. ANTHONY: Yes. Mr. Commissioner
17 the statement of evidence up to and including page 30
18 indicates the list of the reports and the maps showing
19 the location, and I would ask that this be accepted
20 as part of his evidence without necessarily referring
21 to, or reading the supplement to that material.

22 THE COMMISSIONER: Fine.

23 Q Dr. Novakowski, you may
24 have told us this but I didn't get it. Where does the
25 peregrine falcon go in winter? What southern migratory
26 passage?

27 A Yes, this is a real
28 problem, Mr. Commissioner, for the simple reason that
29 the peregrine winters in South America and though the
30 United States, particularly the United States and

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2 Canada, have reduced almost to zero the use of organo-
4 chlorines, South America has not, and that in fact is
3 where they pick up most of their organo- chlorine load,
4 which of course reflects itself in poor reproductive
5 success when they come here.

6 THE COMMISSIONER: Oh yes.

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1 MR. ANTHONY: Mr. Commis-
2 sioner, I refer you then to page 31 of the
3 statement of evidence and I would ask you, Dr.
4 Novakowski, what are your general recommendations
5 about the management and preservation of rare and
6 endangered species?

7 A The management and
8 preservation of rare and endangered species in the
9 Northwest Territories requires special regulatory
10 measures relating to the protection of the species
11 and its habitat. At present and in the context
12 of those species submitted by Canada and listed in the
13 Convention on International Trade In Endangered
14 Species of Wild Fauna and Flora, the Northwest
15 Territories and the Yukon Territory Governments
16 are the regulatory agencies who regulate trade under
17 a special permit under the Export and Import
18 Permits Act of the Federal Department of Industry
19 Trade and Commerce.

20 There is one problem
21 with this which would create a horrendous bureau-
22 cratic nightmare, and that is that in actual fact
23 there are very few export controls in Canada for
24 the simple reason that the Canadian Customs do not
25 man their export lanes, so that in relation
26 to our exports, we depend upon other countries
27 to police those permits for us. We do the same on the
28 import side.

29 THE COMMISSIONER: What
30 did you say, the Canada Customs do not what ?

1 A Do not man their --
2 in other words, the export lanes, when you are leaving
3 Canada, there is nobody there to check you out.

4 THE COMMISSIONER: Oh, I
5 see.

6 A Number one, it is
7 recommended that the protection of endangered
8 species in the Northwest Territories and the Yukon
9 Territory, beyond the regulatory functions mentioned
10 above, be transfered to federal-territorial
11 joint responsibility using the Canada Wildlife
12 Act as a means of protecting a species and
13 its habitat. Regulations of a kind mentioned
14 below would be written for each specific area.

15 These are examples,
16 particularly in relation to endangered species:
17 entry into such an area would be by permit only;
18 recommendations for entry and for any use other than
19 the prime use would be stated in the permit; a
20 national policy for the protection of rare and
21 endangered species would be involved in both terri-
22 tories and we would expect that such a policy
23 would be considered in any application by developers
24 before permission for development to proceed can be
25 granted. The strength of this recommendation lies
26 in the fact that if an endangered species and its
27 habitat is involved absolute protection for the
28 species is imperative as a matter of national policy
29 and is not subject to administrative fiat. That
30 may be an euphemism for a political decision. In other

1 words, we consider such areas as inviolate until such
2 a time as an animal has recovered and is considered
3 as being out of danger.

4 Number two, it is recommended
5 that in the event that development inadvertently
6 intrudes into an area set aside / ^{as an} endangered species
7 habitat, that the developer has a public responsibility
8 to assist in the rehabilitation of that species or
9 its habitat.

10 This is only speaking in
11 terms of a responsible corporate citizen.

12 In the context of pipeline
13 development in the Northwest Territories and Yukon
14 Territory, I am not sure that endangered species and
15 their habitat was considered in development plans.
16 Areas of some of the endangered species were known,
17 this is referenced to the Arctic Ecology Map Series
18 which is available to the public without charge
19 for the last five years, as were the important
20 wildlife resources and their geographic distribution.
21 Also, the majority of the I.B.P. areas outlined
22 by panels 9 and 10 have been so designated largely
23 on their floral uniqueness, that is, the plants.
24 Those, with very few exceptions, and these relate
25 to the geological phenomena which they wish
26 protected, are also wildlife habitat and in view of
27 the fact that most northern wildlife populations
28 have a precarious existence, the use or destruction
29 of IBP areas would concomitantly have a large
30 effect on wildlife populations. That is why the

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In Chief

relationship of critical areas for wildlife and IBP areas as well as other reserves and preserves is a very direct one.

The Canadian Wildlife Act was promulgated in 1973 with the advice and consent of the provinces and territories before it received Parliamentary approval. As such, both the Northwest Territories and the Yukon Territory Government are involved as participants in the Convention on International Trade in Species of Wild Fauna and Flora -- Endangered Species of Wild Fauna and Flora, through the established Scientific Authority and the Management Authority. They are also involved in the policy discussions relating to the Canada Wildlife Act. It should be mentioned that a national rare and endangered species policy is under discussion and that we are making strides in the protection of habitat of rare and endangered species through our National Wildlife Area program.

Dr. Peterson referred to this program in his testimony.

A part of that program involves, for example, the protection of winter range for the California bighorn, an endangered species in British Columbia. That specifically is the Vasso Lake National Wildlife Area. We have a number of sanctuaries in the Northwest Territories and the Yukon Territory for the protection of nesting and staging areas of migratory birds. There are also some reserves which are ostensibly designated for the

1 protection of endangered species. Chief of these
2 are the Thelon Game Sanctuary for the protection of
3 muskoxen and the Mackenzie Bison Sanctuary for the
4 protection of wood bison. However, these were
5 designated under the Territorial Act, so that the
6 land is not withdrawn, the Territorial Act, giving
7 the Commissioner powers for the preservation or
8 conservation of game only.

9 Under the Canada Wildlife
10 Act we will seek to withdraw land under the Territorial
11 Lands Act rather than seek a special designation
12 under the Territorial Ordinance. I would suspect
13 that some of the IBP areas would be so designated
14 as both territorial governments agree that their
15 ordinances are inadequate to deal with the land
16 question. It should also be mentioned that we
17 expect that general regulations for the management
18 of national wildlife areas will be established within
19 the next year and that specific regulations for the
20 management of a specific National Wildlife area
21 will be written shortly thereafter. The process
22 is now underway.

23 MR. ANTHONY: Thank you,
24 Dr. Novakowski, and now would you answer any questions
25 that any of the other counsel may wish to direct to
26 you.

27 THE COMMISSIONER: Mr. Ryder,
28 what is the order of the questioning?

29 MR. RYDER: I think it is
30 Arctic Gas and then Foothills and then Mr. Bayly and

N.S. Novakowski
Cross-Exam by Lutes.

1 then myself.

2 THE COMMISSIONER: Fine.

3 MR. CARTER: Sir, I thought
4 that yesterday was an exception that we came
5 second to last, just before Mr. Ryder, but I can
6 proceed now.

7 MR. LUTES: I would be
8 glad to go first.

9 MR. RYDER: If Mr.
10 Lutes can bail us out than perhaps he should start.

11 THE COMMISSIONER: Yes, sure,
12 Go ahead, Mr. Lutes .

13 CROSS-EXAMINATION BY MR. LUTES:

14 Q I just have three
15 questions. The first one is with reference to the
16 first paragraph on page seven. Perhaps I don't have
17 to read it. We could just take a look at it. I am
18 not sure that I understand exactly what the thrust
19 of that paragraph was and that is the one starting
20 with the words, "The incorporation of future management
21 needs..." Maybe you could just explain to me what
22 you meant by that.

23 A Future management needs,
24 should have read, I am sorry for that om ission,
25 the incoorporation of future wildlife management
26 needs as they relate to pipeline development,
27 should have been involved -- the needs and requirements
28 should have been involved before the pipeline
29 corridor was planned. That is what I meant by that
30 statement. In other words, it should have been in the

N.S. Novakowski
Cross-Exam by Lutes.

1 preplanning of the pipeline corridor, in the preplanning
2 stage.

3 Q Is that just an
4 observation about the present status of wildlife
5 management in the area generally, or is there some
6 implication that there is something that should be
7 getting done now that isn't being done?

8 A Well, it is both, one
9 that I am sure that those people involved in the planning
10 of a pipeline corridor didn't even consider wildlife,
11 that is number one; and number two, yes, you are
12 right, wildlife management is not that well defined a
13 science or an art, if you want to call it that, to
14 be able to meet that kind of a criteria.

15 Q Maybe this leads me
16 to what was to be my last question which was --
17 I am just asking this as a general observation, would
18 it be your view that having regard to what you
19 see as the wildlife management problems in the
20 Mackenzie River basin, do you feel that a pipeline
21 of the nature suggested by the Foothills group, which
22 is simply limited to the area between the Beaufort
23 Sea and the northern border of Alberta can be
24 constructed consistent with what you see as your
25 needs for wildlife management?

26 A To answer that in a
27 general way, and you asked a general question, that--
28 I don't think that there is any difference, except
29 as a matter of scale. In other words, you are going
30 to encounter wildlife problems if your line is 1,000

N.S. Novakowski
Cross-Exam by Lutes

1 miles or 2,000 miles long. In other words, I don't --
2 in consideration of the animals, all animals operate
3 within their own special niches, they have their
4 own special requirements and within certain ecosystems
5 so that your chances of encountering these kinds
6 of conflicts increase with the increase in the
7 territory you use for a pipeline, so that on
8 straight mathematics you could say yes, the
9 Foothills line is going to have fewer wildlife
10 conflicts than the longer line.
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N.S. Novakowski
Cross-Exam by Lutes

1 Q Yes, I really wasn't
2 trying to get that observation out of you. What I was
3 really trying to say is can we satisfy your needs in
4 terms of wildlife managment and still build this
5 pipeline?

6 A Yes, with the certain
7 qualifications that I gave in my testimony.

8 Q O.K., my next question
9 relates to the intrusion in the Mackenzie Bison Sanctu-
10 ary of our Yellowknife lateral.

11 A Yes.

12 Q My question is really much
13 the same. Can that lateral be facilitated within the
14 Bison Sanctuary? Maybe I should say to you that it's
15 a service lateral, it's a small diameter pipe. There
16 will be no compressor station or above-ground facili-
17 ties in the area. Under those circumstances can you
18 comment on whether that can be accommodated within the
19 sanctuary?

20 A The pipeline route as I
21 see it, and I've only recently seen it so that I
22 haven't really had a chance to examine it in depth,
23 is that not taking into account the expansion of
24 the population of that pipeline route would not really
25 cover very important bison range. I think I can use
26 an analogy here, and that is of course the land that
27 is supposedly much more inviolate than the Mackenzie
28 Bison Sanctuary is at the moment, for the simple reason
29 that the land has not been withdrawn in the sanctuary
30 such as the National Parks have managed to accommodate

N.S. Novakowski
Cross-Exam by Lutes

1 both gas lines and oil lines; so yes, possibly.

2 Q I take it on page 20 your
3 reference to two of the I.B.P., the proposed I.B.P.
4 sites being jeopardized by pipeline alignment don't
5 affect the Foothills alignment. You were referring to
6 the CAGPL alignment.

7 A Yes.

8 Q Did you have access to
9 our alignment material? Well, do you have copies of it?

10 A Excuse me. Who are you?

11 Q Foothills Pipe Lines.

12 A You're Foothills, all

13 Q:
14 right. /Well, the devil's going to make me say this,
15 it's just that our pipeline alignments may be quite
16 important and I'll be glad to arrange to have them
supplied to you if you haven't had access to them.

17 A Yes, only in a very general
18 way.

19 Q Page 31 you referred to
20 the creation of specific areas, I take ^{it} these are specific
21 areas where you see -- or the creation of some sort
22 of preserve which you see as necessary for the protection
23 of some endangered species

24 A Yes.

25 Q Do you have any areas in
26 mind, and let me tell you where I'm going to with this
27 so I don't waste any time, but -- and if you have some
28 areas in mind, do the present pipeline alignments en-
29 croach on any of those areas in a severe way?

30 A In relation to endangered

N.S. Novakowski
Cross-Exam by Lutes
Cross-Exam by Bayly

1 species, the major one of course would be the Campbell
2 Lake-Dolomite Lake area, which is an I.B.P. area; but
3 which as Dr. Peterson has stated, is certainly being
4 considered under the Canada Wildlife Act, and of course
5 it's my responsibility to make this presentation to the
6 Committee and seek withdrawal under that Act.

7 Once it is a national wildlife
8 area, then a different set of regulations would apply.

9 MR. LUTES: O.K., thank you,
10 Dr. Novakowski. You can go now, Mr. Carter.

11 MR. BAYLY: I t appears there
12 isn't any real order of cross-examination at all, Mr.
13 Commissioner, but I'm quite content to go now.

14

15 CROSS-EXAMINATION BY MR. BAYLY:

16 Q Dr. Novakowski, you've
17 referred on page 3 of your prepared evidence to fox
18 populations.

19 A Yes.

20 Q And I wonder if you've
21 considered foxes that den on the North Slope of the
22 Yukon and whether they might be affected by the pipeline
23 construction that is contemplated for that area?

24 A On the North Slope of
25 Alaska or --

26 Q Of the Yukon.

27 A -- of the Yukon.

28 Q Yes, I think you can include
29 Alaska in there if you like. The pipeline does go across
30 the boundary and I'm sure the foxes don't consider it.

N.S. Novakowski
Cross-Exam by Bayly

1 A No, they don't. The
2 distribution of denning sites is not that site specific
3 that there would be certainly local populations at
4 hazard, yes, but not the general population, which is
5 dependent upon other things other than disruption of
6 denning sites.

7 Q So when we're talking about
8 endangering a species, that doesn't mean that local
9 populations may not be affected, may or may not be
10 affected.

11 A That's right.

12 Q It's talking about the
13 integrity of a species and its ability to continue to
14 exist.

15 A Yes, that's right.

16 Q And that, I gather, would
17 be a statement that would apply to foxes in the Tuk
18 Peninsula that might be -- and Richards Island area --
19 that might be affected by not only the pipeline but the
20 related facilities.

21 A Yes.

22 Q Now, in this statement as
23 well, on foxes, you have said in the second sentence

24 "However, oil and gas exploration on such areas
25 as Banks Island definitely increases the risk from
26 increased hunting pressures."

27 I'm curious to know, is that because you would anticipate
28 more people moving to Banks Island?

29 A No, I said hunting pressures.
30 In this case I really meant trapping pressures which

N.S. Novakowski
Cross-Exam by Bayly

1 only mean increased accessibility.

2 Q So any roads, etc., that
3 they might make --

4 A Yes.

Q All right, in terms of
access, if I were to suggest to you that with or without
roads, if you're using a skidoo on treeless Banks Island
that particular aspect of access may not be changed
very much.

10 A No, it's already a
11 practice on Banks to harvest in that way.

12 Q Yes. Did you include in
13 this consideration that went into this, the affects of
14 other aspects of oil and gas exploration, such as
15 seismic activity on fox denning, which I understand was
16 an issue in Banks Island, several years ago.

17 A I don't know if in fact
18 this Inquiry has discussed the aspects of exploration,
19 particularly seismic activity, and certainly it is
20 a very important factor, on a more local scale, but
21 which has a cumulative effect.

Q We have heard some evidence in communities expressing concern over seismic and its effect on some of the animals, and particular there was some concern over muskrats in water where seismic was either conducted or adjacent to which seismic was conducted -- seismic operations were conducted. Can you outline for us from your point of view what these local effects of seismic operations on fox populations might or would be?

N.S. Novakowski
Cross-Exam by Bayly

1 A I don't know whether I
2 would want to tackle that one because it might be largely
3 conjectural. This involves behavioural aspects mostly
4 and the adaptability of certain species to those kind
5 of conditions, and the behavioural aspects of most of
6 our northern mammals have only begun to be worked on
7 in later years. It would be conjectural.

8 Q Could you venture a guess
9 as to what behaviour would be affected that might have
10 something to do with the possible loss of population, or
11 what is the concern in behaviour that will be related
12 to seismic? I don't mean to pin you down to something
13 that is proven but something that you may suspect and
14 think deserves further study.
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N.S. Novakowski
Cross-Exam by Bayly

1 A Well, the destruction of
2 denning areas which of course would be very localized,
3 and a local diminution of food resources, and for
4 example, even a slight computation such as a muskeg
5 tractor travelling, which is a wide-tracked vehicle,
6 travelling over a hundred miles and back would in fact
7 at the wrong time of year, would in fact destroy 100
8 acres, so you take 100 acres of productivity out of
9 that particular equation. This could have an accumula-
10 tive effect on the food resources of a species such
11 as the fox.

12 Q O.K.

13 A But it might be far-
14 fetched.

15 Q You're referring to the
16 small animals, the lemmings and this sort of thing?

17 A Yes.

18 Q Whose habitat might be
19 destroyed.

20 A Yes.

21 Q And I gather your concern
22 for example on Banks Island is that it is not -- it
23 being cut off from the mainland is not a place where
24 the fox population would be able to readily recover
25 because foxes couldn't re-invade an area that had been
26 left after disturbance.

27 A No, the management and
28 for that matter the total ecology of island ecosystems
29 is an altogether different facet of biological inves-
30 tigation than say the mainland of the Northwest

N.S. Novakowski
Cross-Exam by Bayly

1 Territories. It requires an entirely different concept.

2 Q Now when you refer to
3 behaviour as well, are you referring as well to the
4 fact that foxes may accommodate themselves to camps of
5 men and habituate those as food sources rather than
6 going to their wild food sources?

7 A Yes, this has already
8 happened. I'm sure it's been recorded. Even more
9 so-called secretive animals have done this. A wolf is
10 an example. This may be based on habituating to
11 another food source, or it may be just natural inquisi-
12 tiveness, it's hard to say.

13 Q Do we know whether in
14 fact foxes would come back to an area where their dens
15 had been, or their denning areas had been tampered with,
16 say along the North Slope where it is possible that
17 certain den sites might be used for gravel mining
18 operation.

19 A I wouldn't care to speculate
20 on that. As you know, natural denning sites and dens are
21 abandoned for no good cause and then are returned to
22 again some other time in the future. So what guides the
23 fox into abandoning and then re-colonizing a den is
24 -- I would have to use some anthropomorphic designation.

25 Q So we have no way of tel-
26 ling whether, even though the integrity of the species
27 might be retained, whether a population of say, foxes may
28 or may not come back to an area in which they had been
29 disturbed.

30 A Yes. The point again is

N.S. Novakowski

Cross-Exam by Bayly

1 | that the foxes may be disturbed,^{but} what happens to their
2 | habitat, the habitat is the key. If their habitat is
3 | in any way modified or destroyed, then the animal will
4 | have to adapt to some other environment.

5 Q Now, I gather this is the
6 same sort of thing that may happen to marten if you
7 remove some of the forest.

8 A Yes.

9 Q Then it becomes less
10 suitable for them and they have to go elsewhere.

117 A Yes.

12 Q Would you be concerned
13 with those areas -- and I believe you were here this
14 morning -- that we were talking about with Mr. Zoltai
15 in the Peel River, McPherson area, if a large number of
16 trees were cut from an area that had marten in it?

17 A Well yes, any removal
18 of trees -- and I'm sure for the particular use that
19 was mentioned this morning, it would effectively remove
20 the oldest and the most mature trees, and that would
21 in fact effectively remove the habitat of the marten.

22 Q All right. Now you've
23 referred to the dilemma with regard to beaver, and I
24 assume it's applicable to muskrats as well, of either
25 locating a pipeline facility in their area, because it
26 would disturb them immediately, or locating it upstream
27 of where they are because it would disturb them poten-
28 tially if there were some sort of a spill and they were
29 downstream of it. I gather the only way of avoiding that
30 is to place facilities downstream of beaver habitat.

N.S. Novakowski
Cross-Exam by Bayly

1 A Yes, in the lowest possible
2 elevation.

3 Q That's not to say that
4 that won't conflict with other --

5 A With other resources,
6 absolutely.

7 Q Now, I'm curious, we
8 did have from Dr. Gunn last week a description of what
9 happens to sea ducks when they encounter spilled fuel
10 oil, and what happens when they encounter fuel oil
11 and dispersant, and I wonder if you have had any exper-
12 ience with either beavers or muskrat that have encounter-
13 ed spills and then could describe what happens to them?

14 A This is a question of course
15 which relates to the peculiar habits of, for example,
16 the beaver, which much like the duck, does quite a lot
17 of preening, and so that -- and also much like the
18 duck, very responsive to such things as chill factors
19 as a result of the natural insulation being removed
20 so that first of all, both the muskrat and the beaver
21 would ingest a great deal of the oil by trying to clean
22 it themselves, and this may in fact be toxic. Other
23 than that, in the north when you're dealing with a
24 cold environment for the largest part of the year, that's
25 certainly another mortality factor that would be involved.

26 Q Would that apply to
27 dispersants as well? Do we know whether dispersants
28 will cause a loss of the insulating factor of the
29 natural oils and things in the coat of beaver and
30 muskrats?

N S. Novakowski
Cross-Exam by Bayly

1 A Again the same thing will
2 happen. The animal will attempt, and I have personally
3 experimented with this, will attempt to provide his
4 own insulation, and if the dispersant will in fact
5 remove the toxic oil, the beaver can replace that in
6 a matter of say half an hour. So if he can survive
7 that long, he can survive.

8 Q Will it also remove the
9 natural oil from beaver?

10 A Oh yes, it will. But he
11 can recover that in very short order.

12 Q So provided he doesn't
13 go back into the water where he found the dispersant
14 and get his natural coating removed again, he should
15 be all right.

16 A Yes.

17 Q So in that sense there's
18 a difference between beavers and sea ducks --

19 A M-hm.

20 Q --in that it appears that
21 the duck's coating is removed by the dispersant as
22 well as the -- by the oil.

23 A Yes. There's a differ-
24 ence in the sebacious glands.

25 Q All right. Now, have we
26 got examples that give us indicators of disturbance
27 of habitat to aquatic furbearers that have been found
28 to either be associated with development, or which
29 can be directly attributed to it that we might be
30 able to learn from?

N.S. Novakowski
Cross-Exam by Bayly

1 A No, at least from either
2 a numerical or a statistical sense, no.

3 Q So we have observations
4 of whether there are animals of a certain type in an
5 area --

6 A Yes.

7 Q -- after a development,
8 but this has not been monitored, to your knowledge.

9 A No. The only present
10 technique that is used is the most simple technique,
11 which is the absence-presence type of designation. If
12 an animal was there at one time and is not present there
13 now, something has happened to either his niche or
14 his environment.

15 Q Yes. Now, you refer at
16 page 7 of your evidence to the question of game
17 management, and you talk about incorporating future
18 wildlife management needs as they relate to pipeline
19 development, and you talk about the pre-planning stage.
20 Is that now? Are the concerns that you have expressed
21 ones which should be being planned for now?

22 A No. I am talking about
23 something that should have happened years ago.

24 Q So we're already late.

25 A Yes, we're already late.

26 Q And in your opinion that
27 ability to manage in the face of a project of this
28 nature is not there yet.

29 A No, it's not there yet
30 but it is included in the recommendations.

N.S. Novakowski
Cross-Exam by Bayly

1 Q You have referred
2 to impacts on grizzly bears and I am advised that
3 there are grizzly bears on Richard's Island, and
4 have you an opinion as to whether that population,
5 at least locally, is likely not to survive hunting
6 pressures on this project if it goes ahead?

7 A That particular
8 population on Richard's Island, has already received
9 its fair share of harassment and has managed
10 to survive, that is, by researches, and certainly
11 they must be considered as a modifying factor on the
12 environment as much as any pipeline company.

13 So I would say under
14 rigid control, and though I say that we have the
15 taxonomy of ursus artos, the brown bear,
16 is in a muddled state right now, that is definitely
17 a sub-population and as such it is very important
18 from an endangered species aspect.

19 Q Now, that gets us
20 into another aspect, I understand, of rare and
21 endangered. It may well be that a species remains
22 in tact, but that locally its population is destroyed,
23 or the habitat of its population is destroyed so that
24 it moves off, and if that happens we face the kind
25 of situation that I gather we face with the wood
26 bison, that you have to reintroduce them either to
27 a former traditional habitat which I understand, the
28 one between the highway and Great Slave Lake is, or
29 into a new habitat where they can breed without the
30 pressures of man and shrinking acreage for grazing,

N.S. Novakowski
Cross-Exam by Bayly

etc.

2 A Well, even if there
3 wasn't any influence by man, the concentration
4 of a small population dealing with, in this case,
5 the nucleus, the core population which is 18
6 animals, means that we are dealing with a very
7 restricted gene pool which is then very vulnerable,
8 and so under any circumstances, even if there
9 was no interference from man, we would be forced
10 to disperse that population into other areas or a
11 similar one so that there is always this chance
12 for genetic interchange.

13 Other wise, that population
14 would become over specialized, genetically over-
15 specialized and would be much more vulnerable to
16 extinction.

17 THE COMMISSIONER: The
18 grizzly bear is classified as endangered under the
19 Convention on International Trade in Endangered
20 Species -- is that right? Or does that get us
21 into taxonomy?

22 A No, it doesn't.
23 It gets us into the statutes and interpretation
24 of the statutes of the Convention which -- which
25 was agreed to by 72 nations, each with their own
26 interpretation.

27 THE COMMISSIONER:: You
28 said, I think, that the polar bear was classified
29 as endangered under this International Convention
30 on Trade in Endangered Species and you explained that

N.S. Novakowski
Cross-Exam by Bayly

1 since they were taking them it was an anomaly. In
2 the case of grizzly bears; for instance, we were
3 told that there were about 1,000 barren ground
4 grizzlies in the Western Arctic. Would that be
5 an endangered species, either under Canada's
6 interpretation of this Trade agreement, or generally
7 according to the views held by people like yourself?
8 Maybe I am trying to make this too simple, but see
9 if you can help me out.

10 A Yes, the designation
11 relates to the three appendices to the Convention
12 and if the Grizzly bear, for example, was an
13 Appendix I species, that is, an animal in danger
14 of extinction, then there would be an extremely
15 restricted trade in the species, generally
16 between world recognized zoological gardens and that
17 would be about the extent of it.

18 The grizzly bear in this
19 case is an Appendix III item which only implies that
20 the bear is not in danger, but that we would like
21 international co-operation in its management.

22 THE COMMISSIONER: And
23 that is where you sit personally, is it?

24 A Yes. Well, that is
25 how Canada interprets Appendix III.

26 THE COMMISSIONER: Yes, I
27 know that Canada interprets it, but you think that that
28 is a sound proposition?

29 A That is a sound pro-
30 position, but we are again caught on the horns of a

dilemma with the taxonomic designation, in other words, we would dearly love to have somebody say, yes, this is a barren ground grizzly and there is a very strong possibility that most of the grizzlies in the western Arctic are probably intergrades of another subspecies, the Mackenzie Mountain form and probably might not be valid but that we would consider that part of the eastern Mackenzie District and Keewatin as the pure form of the barren ground grizzly and as such, should protect that. But we can't even say that.

THE COMMISSIONER: Well, let's adjourn for tea. We will finish in good time, will we, Mr. Ryder?

MR. RYDER: I expect so.

MR. BAYLY: Four questions, Mr. Commissioner.

(PROCEEDINGS ADJOURNED)

1 (PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

2 MR. ANTHONY: Before
3 Mr. Bayly continues. This morning Mr. Ryder in
4 his cross-examination asked Dr. Peterson about
5 the three applications for IBP ecological sites and
6 I now have the full application for all three
7 sites and I will be tabling these as the next
8 exhibit.

9 THE COMMISSIONER: Thank
10 you.

11 (APPLICATIONS TO MINISTRY OF INDIAN AND NORTHERN
12 AFFAIRS FOR WILLOW LAKE, DOLOMITE LAKE, CAMPBELL LAKE,
13 AND CARIBOU HILLS ECOLOGICAL SITES MARKED AS
14 EXHIBIT 373)

15 MR. BAYLY: We were talking
16 about the grizzly bears on Richards Island. Assuming
17 that they survive harassment from both hunting
18 and watching whether it is professional or not, do
19 you see any danger of their habitat being reduced
20 by gas plants and feeder lines to such an extent that
21 they will no longer be viable as a result of this
22 project?

23 A There most certainly
24 is that possibility as far as a viable island population
25 is concerned. I don't believe that we have addressed
26 ourselves, or at least, certainly I haven't in
27 relation to the -- such things as plants, or for that
28 matter, collector systems, which will use a considerable
29 amount of habitat and whose environmental effects may
30 be on a much broader scale than a very localized.

N.S. Novakowski
Cross-Exam by Bayly

1 Q So you see that as a
2 problem, but one that you haven't had a chance to
3 assess?

4 A Yes, that is correct.

5 Q Now, one of the concerns
6 that has been expressed in this Inquiry, and one
7 about which the applicants have made some tentative
8 suggestions, are the problems of man-animal inter-
9 action, and particularly that between men and bears
10 at camps, and have you thought of recommendations,
11 in addition to any that they might have made,
12 which might cause the man-bear interaction to
13 result in something other than the shooting of the
14 bear?

15 A Yes, and I alluded
16 to that in my testimony. This is the type of adversive
17 conditioning that has been tried most successfully
18 by Alberta. There probably, there are other techniques,
19 but certainly the so-called classical techniques,
20 such as live trapping and moving them on to other
21 locations hasn't worked. Once they become
22 habituated they return, in most cases over large
23 distances. The possibility of shooting them doesn't
24 solve the problem, for the simple reason that nature
25 abhors a vacuum and somewhere along the line another
26 one is going to show up, so that it is better that -
27 you fill that niche with a resident bear who just
28 doesn't like camps than shoot him and leave the
29 territory open to another one who is not so habituated.

30 Q I had suggested to Mr.

1 Jakimchuk of Arctic Gas that a possible solution would
2 be keeping dogs in camps. His feeling was that dogs
3 might well attract bears rather than just act as a
4 warning system. Do you have any opinion on that?

5 A Well, this is a
6 personal opinion. I am quite ambivalent about the
7 use of dogs from the stand point of a pure scientist,
8 and that is the presence of dogs make them vulnerable
9 to hybridization with indigenous wolves, and the
10 situation, for example in Ontario is so badly
11 fouled up, in this respect, that they don't really
12 know what they are dealing with. In relation to
13 man -- or dog - bear, I believe that probably they
14 would attract bears because -- rather than scare
15 them off for the simple reason that they announce
16 their presence over a large area.

17 Q And this would
18 cause a bear, you feel, to come and investigate as
19 ^{to} opposed/ignoring the camp?

20 A Yes, investigative
21 instincts would be aroused.

22 Q All right. Given that
23 a bear has already become habituated to a camp, would
24 you recommend keeping a dog around to warn of its
25 approach, assuming that these things may happen on
26 this project?

27 A It may, but there are
28 other electronic measures which don't require to be
29 fed everyday

30 Q Are you thinking of

N.S. Novakowski
Cross-Exam by Bayly

1 electric fencing and this sort of thing?

2 A Yes.

3 Q Maybe you will find a
4 way of gas powering the electric fence --

5 Now, my information with
6 regard to your evidence on page 18 about wolf bounties
7 is that although there has been a wolf bounty in this
8 territory, that this is no longer the case and that
9 the wolf bounty was removed in the Northwest Territories
10 in March of 1975, were you aware of that at the
11 time of writing your evidence?

12 A Yes. All I can say
13 is that, no, I wasn't aware of it, and in a sense only
14 I am pleased to see it removed, because the bounty
15 system has been a black mark on our records, so to
16 speak, for a long time. However, as an aside, it
17 should be, in all honesty, stated from a wildlife
18 management standpoint, the bounty system was not
19 instituted in the Territories for the purpose of
20 controlling wolves. It was only instituted as an
21 extra added incentive for people to kill wolves.

22 Q So it acted as a
23 wolf subsidy rather than a bounty?

24 A Exactly, yes.

25 THE COMMISSIONER: Sorry,
26 it was to get people to kill wolves, but that
27 killing of wolves wasn't part of any game management
28 program, is that what you are saying?

29 A Yes, that is correct.

30 THE COMMISSIONER: Well, the

N.S. Novakowski
Cross-Exam by Bayly

1 idea of killing wolves was thought to be worthwhile
2 for its own sake?

3 A No, from the
4 wildlife management standpoint, our wish has been
5 across Canada, including the Northwest Territories,
6 that at least the wolf rather than being poisoned
7 by the various types of poisons which also involve
8 a broader spectrum of animals, that he be classed as a
9 game animal, and at least that gives him a fighting
10 chance, and that at the same time in the last number
11 of years, the long furs, so to speak, of which the
12 wolf is included, have increased in price, so that
13 he is an animal of value for his pelt, rather than as
14 vermin or a nuisance, which is why they had the
15 bounty system historically in Canada. So that in
16 the Territories when a wolf was taken there was
17 the price of the pelt and an added incentive in the
18 form of a bounty.

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N.S. Novakowski
Cross-Exam by Bayly

1 MR. BAYLY: Q Now you've
2 described the grey wolf as a threatened species. Does
3 that mean that you would advocate different game
4 rules than are now in existence for this species?

5 A Well, the grey wolf, of
6 course, *canis lupis*, is distributed throughout North
7 America, the only other member of another species
8 being the red wolf; but the many sub-species, in fact
9 a number of them are already extinct in North America,
10 one being the so-called Beatus wolf of Newfoundland,
11 the other being the Great Plains wolf, and in actual
12 fact it is now felt the Rocky Mountain wolf is also
13 extinct. That's a poor record, and in fact the situation
14 is much worse in the United States. So that I am
15 talking about at the sub-species level, not the grey
16 wolf as the species.

17 Q Now we may be faced then
18 with a continental problem with regard to wolves where
19 the concentration of population is in the Yukon,
20 Alaska and the Northwest Territories for the continent.

21 A I would say that of the
22 few sub-species that might be threatened in the north,
23 that you would have an interest of the total North
24 American conservation community focused on that parti-
25 cular pipeline, and wolf management. You would attract
26 them like flies.

27 Q That is the wolf watchers.

28 A Yes.

29 Q It would be a spinoff
30 impact of the pipeline. You have referred at page 19

N.S. Novakowski
Cross-Exam by Bayly

1 with regard to the polar bears of international
2 co-operation because the habitat of bears may cross
3 the Alaskan-Yukon boundary.

4 A Yes.

5 Q Now, what are our
6 obligations, as you understand them, with regard to
7 this population, and let's take an example. If there
8 is an oil spill in the Beaufort Sea off the coast of
9 the Yukon, have we obligations as you understand them
10 to some American authorities to protect that inter-
11 national population of polar bears?

12 A Yes, and jointly. The
13 obligations on both sides, in spite of the dicotomy of
14 the management techniques, in other words on the
15 Alaska side bears are not hunted; on the Canadian side
16 bears are hunted. There is an obligation, a joint
17 obligation between the two nations to help in contingency
18 work.

19 Q And does that set out in
20 the convention that you've referred to, to which Canada
21 is a signatory?

22 A Yes, it's one of the
23 management agreements. The research agreement is already
24 and has been for many years, well under way.

25 Q Those are all the questions
26 -- oh, let me read this one. I understand that you are
27 a member of the government I.B.P. Committee, is that
28 correct?

29 A Yes.

30 Q And we've had evidence

N.S. Novakowski
Cross-Exam by Bayly

1 today from Dr. Peterson with regard to proposals for
2 I.B.P. sites. Do you know anything about the status
3 of the proposals and in particular of the ones that
4 he was discussing this morning on the Firth River and
5 the Old Crow Flats?

6 A The Firth River and the
7 Old Crow Flats have not even been brought before the
8 Committee. Rightly or wrongly, neither the
9 Committee nor the Department of Indian Affairs are
10 taking any initiatives in this matter. In other words,
11 they are depending upon the I.B.P. Committee, or at
12 least panels 9 and 10 for the setting of priorities
13 and submissions.

14 Q All right now, in the
15 area that is proposed to be affected, or within the
16 area of the two pipeline applications, have any of the
17 I.B.P. sites in that area been actively proposed to the
18 Committee?

19 A Yes, the Campbell Lake-
20 Dolomite Lake site has been classed as the No. 1
21 priority, followed by the Caribou Hills, and thirdly
22 by Cirque Lake, which is not involved in the pipeline
23 corridor.

24 Q And these are classified
25 as various levels of priorities by the Committee. Have
26 they gone to the Department of Indian Affairs or to
27 whoever they go from you for approval, and has any
28 approval been granted in principle or otherwise?

29 A I have to be honest with
30 you in that it will follow the regular bureaucratic

N.S.Novakowski
Cross-Exam by Bayly

1 procedures, and go up certain levels and --

2 THE COMMISSIONER: Then across.

3 A -- then across. Whether
4 you use an inverted pyramid or the other kind, that's
5 still the way it's going to go. Perhaps the paradoxical
6 part of it is that once everybody has made up their
7 mind, the writing of the -- the actual withdrawal of the
8 land as a reserve is a very simple procedure and it's
9 something that I still can't understand after all these
10 years.

11 MR. BAYLY: Q All right, and
12 what it does is it withdraws the land for select
13 purposes.

14 A Yes, that's correct.

15 Q And has this happened in
16 any I.B.P. sites in the Northwest Territories? Have
17 any got to that stage yet?

18 A No. No, no, this is the
19 first.

20 Q All right. So we have no
21 idea how long that process may take.

22 A I have mentioned in my
23 testimony a number of years, I think I said two years.
24 I said it might be opportunistic on the part of the
25 panels 9 and 10 to submit those areas as priority
26 areas that involve either the pipeline corridors or
27 the pipeline routes, and I don't know how the Department
28 of Indian & Northern Affairs would look upon that.
29 In other words, depending upon their position in
30 relation to the pipeline corridors in their applications.

N.S. Novakowski
Cross-Exam by Bayly

1 Q Have they given you any
2 indication of whether sites that are located on or
3 adjacent to the proposed pipelines will be decided prior
4 to or after there has been a decision on either of these
5 routes?

6 A Well, as you're probably
7 aware from reading the Territorial Act, this kind of
8 legislation is already in the Statutes of the
9 Territorial Acts. The Minister can in fact withdraw lands
10 for a reserve or preserve right now. In fact, they are
11 using the much longer procedure which may involve for
12 that matter a reversion to public discussion, public
13 hearings and so on.

14 Q But your committee hasn't
15 been told by whatever part of the inverted pyramid applies
16 that these particular sites that you put forward to
17 them can't be decided or can be decided before the pipe-
18 line has been approved or disapproved.

19 A No, they are keeping --
20 and the committee has agreed -- that each pipeline or
21 each I.B.P. submission will be discussed on its own
22 merits regardless of what other criteria, such as the
23 imminency of say a pipeline application being approved
24 or in other words they are divorced from any management,
25 immediate management prerogatives.

26 Q So you try and put these
27 forward, ignoring or putting aside anyway the fact that
28 one may be on or adjacent to a route that has been
29 selected as a pipeline route.

30 A That's correct. In fact

N.S. Novakowski
Cross-Exam by Bayly
Cross-Exam by Carter

1 they should be dealt with on their own merits.

2 MR. BAYLY: Those are all the
3 questions I have. Thank you, sir.
4

5 CROSS-EXAMINATION BY MR. CARTER:
6

7 Q Dr. Novakowski, if I
8 could just follow up on the proposed I.B.P. site at
9 Dolomite Lake and Campbell Lake, did I understand you
10 to say in response to Mr. Lutes' question that there
11 was a difference between the pipeline alignment of
12 CAGSL and Foothills with respect to that site?

13 A The alignment that I am
14 aware of is the thick line which you see on my testi-
15 mony., and I have subsequently, in fact today, seen a
16 different alignment which seems to indicate that both
17 the Gas Arctic and Foothills would in fact infringe
18 upon the Dolomite Lake-Campbell Lake proposed I.B.P.
19 site.
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1 Q Is that the pipeline
2 itself, or is that some ancilliary facility such
3 as a borrow site?

4 A Well, first of all the
5 proximity of the line and secondly, of course, the
6 borrow site.

7 Q When you say proximity
8 of the line, the line itself doesn't go through
9 the site, is that correct?

10 A I believe the one that
11 I saw, one of them went through the north end of
12 the site.

13 Q Now, another matter
14 that came up, I believe, in cross-examination was
15 about the involvement in the consideration of the
16 wildlife in the planning of the corridor and I believe
17 you stated that the people planning the corridor
18 did not take the wildlife into consideration. By
19 the people planning the corridor, whom did you mean?

20 A I mean the proponent in
21 this case.

22 Q The pipeline applicant?

23 A Yes.

24 Q I see. Rather than the
25 government in its consideration of the corridor?

26 A In my previous answer
27 to an answer of this kind I had accepted on behalf of
28 whatever regulatory agency there is in government, at
29 least 50% of the blame. That this is a characteristic
30 of government in general, we can only react, which is

1 rather unfortunate.

2 Q Now, when you refer to
3 the planning of the corridor and the lack of consideration
4 of the wildlife, how do you -- in what light do
5 you consider the work that has been testified to
6 before this Inquiry with respect to the environment
7 by the various consultants for the pipeline company?
8 In other words, what I am getting at, you have stated
9 that there was no consideration taken of the wild-
10 life, and I am wondering whether you consider that
11 the work excluded wildlife, or on what basis do you
12 make that statement?

13 A The basis I make
14 this statement was that earlier lines or earlier
15 pipeline alignments followed -- used only terrain as
16 the criteria and did not consider the biological
17 resources, that is, either forestry or wildlife.
18 Perhaps this is because it is an engineering document.

19 Q I see, I just wondered
20 the intent --

21 THE COMMISSIONER: That
22 seems to be consistent generally with what we have
23 heard --

24 MR. CARTER: That is right,
25 I just wanted a clarification of that, sir.

26 Q From the wildlife point
27 of view is there some other corridor that you would
28 propose?

29 A From the wildlife
30 point of view, other than endangered species?

N.S. Novakowski
Cross-Exam by Carter

1 Q Yes.

2 A I think it -- providing
3 it does not encompass any large modifications or
4 modifications of the environment, I think that it
5 might be irrelevant with the exception of a few,
6 such as the consideration of total ecosystems of some
7 of the larger mammals, and caribou may be a case
8 in point. We consider the, for example, the fawning
9 grounds, the wintering grounds, the summering
10 grounds, as all part of the total caribou ecosystem
11 and whether in fact you can create such a line or
12 corridor, not to disrupt that total complex, is
13 probably impossible, but in areas where you have
14 more diversity, that is, more biological diversity,
15 you have a better chance to disrupt or modify that
16 particular environment without endangering a particular
17 species. In other words, if I had a choice, that
18 is the choice I would choose.

19 Q I see. I wonder now
20 if I could turn to a few of these species that you
21 dealt with. On page two, you, at the bottom of
22 page 2, sir, you refer to the fisher and it is
23 my information that their range does not extend into
24 the territories, is that your understanding?

25 A Into the territories?

26 Q Yes.

27 A Oh, no.

28 Q How far north is the
29 range of the fisher?

30 A The fisher is generally

N.S. Novakowski
Cross-Exam by Carter

1 found in the forested areas. It is even found occasion-
2 ally as an occasional visitor right into the delta.

3 Q Would you say that
4 its range is more concentrated in the more southerly
5 areas, for example, northern Alberta, northern
6 British Columbia? Is it found to be more common
7 there?

8 A It is part and parcel
9 of the same productivity aspect that I was talking
10 about earlier, in other words, a lot of the animals
11 that we are talking about are at the northern end
12 of their range and the lot of the -- if it is a
13 boreal species as the fisher is, for example, that is
14 the boreal biode which is distributed across from
15 Newfoundland into Alaska, then you would find the
16 highest productivity there and certainly northern
17 Alberta, some small biotic regions in British
18 Columbia, but not all. You would find a greater
19 density than you would find in the Mackenzie.

20 Q If I could deal with
21 next the wolverine, on page 17 of your evidence, you
22 discussed this species, and list three generalizations
23 about the species, and do I understand it that these
24 lead you to conclude, as you state at the bottom of
25 that page, that in general it would appear that
26 human activities are of minimal importance to the
27 survival of the species?

28 MR. ANTHONY: I am sorry,
29 perhaps I can help on that --

30 THE COMMISSIONER: Yes.

N.S. Novakowski
Cross-Exam by Carter

1 MR. ANTHONY: I think in
2 his evidence, that is what he has stated. I am not
3 sure that I understand the question.

4 MR. CARTER: All right,
5 have I got that clear that that is your view that
6 man has minimal impact on the wolverine?

7 A Yes, both in relation
8 to human endeavours, for example, to trap the animal,
9 it then becomes a matter of time and space, or based
10 on the habits of the animal itself, of the solitary
11 animal. If we do have an influence we will never
12 know. That is all I am saying.

13 Q I see. But you
14 can't give us an opinion as to what influence
15 we might have, if, for example, the proposed pipeline
16 is constructed?

17 A The only influence that
18 I can see now perhaps is the concerted effort to
19 perhaps trap the animal because you can get a
20 better price for it. You will have a larger
21 constituency of people wanting trophies from the
22 north to commemorate their short stay in the north --

23 Q Accessibility --

24 A Yes, accessibility.

25 Q The last species that
26 I wish to refer you to, sir, is the grey wolf, and
27 we have discussed this already. I understood you to
28 say that although you have labeled its status as
29 threatened, that this may not be the case in the
30 Northwest Territories, am I correct in assuming that?

N.S. Novakowski
Cross-Exam by Carter

1 A No, no. All I am saying
2 is that the grey wolf as a species is really not
3 threatened, but that certain subspecies, certain
4 forms if you will, or sub populations, definitely
5 are, and there are some that we are concerned about
6 in the North.

7 Q Is it fair to say,
8 however, that these subspecies are more threatened
9 in the south than in the North?

10 A No. In fact, the
11 very opposite.

12 Q Could you elaborate
13 on that, sir.

14 A In other words, there
15 is, with few exceptions, there is no concerted effort
16 to kill wolves in any province in Canada. There is
17 still inducement to kill wolves in the Northwest
18 Territories as a fur bearer.

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N.S. Novakowski
Cross-Exam by Carter
Cross-Exam by Ryder

1 Q I was interested in your
2 answer to the Commissioner, I'm not sure that I complete-
3 ly understood it. You explained the reason for the
4 bounty and you said that the reason was to encourage or
5 to avoid the use of poison, is that what you were
6 saying?

7 A No, the basic reason for
8 the discouragement of the bounty system, which used to
9 be prevalent across Canada in every province, was that
10 first of all it made no appreciable dent in the wolf
11 population, if that was the problem to be solved, and
12 it was in fact a subsidy for a cropping system. But
13 at the time that it was being carried out, wolves had
14 no other value other than of course the intrinsic
15 value as wildlife.

16 Q I see. You referred to the
17 use of poisons, and how did that come into the picture?

18 A I used the term "poisons"
19 for the simple reason that we used a -- or the poisoning
20 scheme, if I may call it that, in the Northwest Terri-
21 tories, at one time was to remove a large segment of
22 the wolf population, particularly that which was impinging
23 upon the caribou, at the time when we considered it a
24 caribou crisis. A very large number of wolves were
25 taken and in the long term, this had no appreciable
26 affect upon the wolf population.

27 MR. CARTER: That's all the
28 questions I have, sir.

29 CROSS-EXAMINATION BY MR. RYDER:

30 Q Can I ask you, doctor, to
refer to

N.S. Novakowski
Cross-Exam by Ryder

1 your preamble and I sense in the preamble on page 1 a
2 message to the Inquiry, but I'm not sure that I have
3 the message accurately. Perhaps I should describe what
4 I take from that page and you can tell me if I'm right.

5 As I understand it, you are
6 telling us that the present legislation, insofar as it
7 may be used to protect wildlife concerns, is not suffic-
8 ient, in your view, and that we need some special laws
9 and the reason that it's not sufficient is because the
10 present legislation is designed to provide conservation
11 areas rather than designed to deal with the species
12 themselves as opposed to dealing with the activities
13 of man which may affect those species. Is that what
14 you're saying in that, is that part of what you're saying
15 in the preamble?

16 A Yes. In actual fact it
17 is only trying to enunciate a change from the norm,
18 the norm being the traditional use patterns of the
19 say, Northwest Territories residents, and this is an
20 extra factor that is being introduced which I said
21 later would certainly be, you know, in a very localized
22 area.

23 Q And then can I take it
24 further and ask you if you envisaged ^{the} gap in this
25 structure of law insofar as this project is concerned
26 to be filled by the environmental conditions which the
27 Inquiry may recommend to government?

28 A Really I made this state-
29 ment because of the -- what I considered to be the
30 dichotomy of administrative or if you wish, regulations

N.S. Novakowski
Cross-Exam by Ryder

1 or laws pertaining to wildlife management, the dichotomy
2 being that one agency may have the responsibility for
3 the management and protection of wildlife, while
4 another the responsibility for that habitat of that
5 wildlife. That's a crucial issue which deprives the
6 manager of developing a total ecosystem concept.

7 Q So the gap between that
8 dichotomy, you would like to see bridged insofar as
9 management -- wildlife management can be used as a tool
10 to reduce the consequences of this particular project.

11 A Exactly, yes.

12 Q Do you have any ideas as
13 to how it may be done, or is that a fair question at this
14 late hour? You see, we have been dealing at some length
15 with the relationship between concerns of the pipeline
16 on wildlife on the one hand and management -- wildlife
17 management as a remedy for these concerns. If you have
18 any light to shed or advances to make in that Inquiry
19 we'd appreciate it.

20 A I would be sticking my
21 neck out if I did. But I would expect that if in fact
22 some member of the Territorial Government were here he
23 would certainly have a ready answer.

24 Q All right, thank you. Can
25 I turn now to the relationship between the right-of-way
26 and the vegetation on the right-of-way that's been
27 cleared and then being maintained on the one hand, and
28 small mammal populations on the other and I wish
29 to put to you a different proposition than that that
30 you discussed with Mr. Bayly. It is this, that the change

1 in vegetation patterns along the right-of-way may have
2 an attractive effect to small mammal populations which
3 would in turn tend to create an uneven distribution in
4 the area of the right-of-way of the mammal population
5 of the area, that you'd have a heavier distribution of
6 small mammals in the area of the right-of-way as you
7 would off the right-of-way.

8 A Well yes, the first thing
9 of/course that you would create would be the well-known
10 edge effect, where you would get a concentration of
11 small mammals. Similarly you can get this kind of
12 concentration of small mammals in any ordinary municipal
13 garbage dump, so you have introduced an artificial factor
14 into their regular distribution and use of natural habi-
15 tat so that I would predict anything could happen but
16 you would certainly get exactly what you say, you would
17 get an increased population in that so-called new
18 environment.

19 Q And wouldn't you also get
20 an increase in the ease of access of that area by people
21 which would have problems on the harvesting of those
22 animals?

23 A Well yes, that is in fact
24 what I alluded to in one part of my testimony for
25 recommendations, in that that would be part of, I think,
26 special either management considerations or stipulations.

27 Q So the management tech-
28 nique that you envisage then would be a prohibition of
29 hunting in that area, or certainly a control of the
30 harvesting in those areas.

N.S. Novakowski
Cross-Exam by Ryder

1 A You can find an analogy to
2 this of course in the -- farther to the south in that
3 farmland is used for laying of pipe and then the farmer
4 has beneficial use there~~after~~ over the pipe. This same
5 thing could apply to a trapper just as easily.

6 Q Now, doesn't that cause a
7 problem because you may have an increased harvest in
8 an area where the population is artificially large.

9 A I don't see that as a
10 problem.

11 Q All right. Let me see
12 if it is a problem. I mean that you'd have a heavier
13 harvest in one area and you would be over-harvesting
14 in one area and perhaps under-harvesting in other areas.
15 That is the area off the right-of-way, because the
16 trappers would be attracted to the right-of-way and
17 in the same way for different reasons, but still
18 attracted to the right-of-way as small mammals are. I
19 always have been told by game managers that an uneven
20 harvest and an uneven distribution of game populations
21 are to be avoided, if possible.

22 A Well, uneven harvest and
23 uneven distribution of wildlife is the rule, not the
24 exception.

25 Q So that's a problem we're
26 living with in any event.

27 A Yes.

28 Q Now, as I understand it,
29 people in game management generally rank the importance
30 of furbearers by reference to the size and amount of

N.S. Novakowski
Cross-Exam by Ryder

1 the income that they produce for the trapper.

2 A Yes.

3 Q And on that ranking system
4 the muskrat would be low on the list, lower than the
5 fine fur species.

6 A Yes, except for the fact
7 that many of the fine furs are widely distributed, where-
8 as the muskrat populations are not. They are generally
9 concentrated and as a result you may be, for example,
10 counting, a good trapper may trap one mink in seven
11 days as an average, or one in three days, whereas he
12 can get up to 100 pelts of muskrat or 100 muskrat a day,
13 so it's a matter of scale as well as --

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N.S. Novakowski
Cross-Exam by Ryder

1 Q That leads me into
2 the subject that I would like to deal with and that
3 is the importance of the muskrat over and above the
4 size of the income that it brings in, as a basis for
5 the economic cycle, yearly cycle of hunters and
6 trappers; the native people in the North. In other
7 words, it is not important because of the size of the
8 income that it produces, but it is important because
9 of the guaranteed nature of the income that it
10 yields.

11 A What you are really
12 talking about or asking, I think, is something that
13 not only wildlife managers have thought about for
14 many years and that is the complete rationalization
15 of the fur industry. Regardless of management schemes,
16 the most independent person in Canada is the trapper,
17 and on top of that he is subject to many external
18 forces over which he has no control. They are trying
19 to remove these as quickly as they possibly can. But
20 to allocate a particular area and a particular number
21 of species to a person as a resource manager or a
22 resource consumptive user, I don't think the science
23 of wildlife management, as at least perceived by
24 scientists hasn't come to that point yet. In other
25 words, they are using economic measures rather than
26 biological ones.

27 Q Well, let me take that
28 a little bit further and, do you agree with me that
29 the importance of muskrat as a basis in the subsistence
30 cycle is illustrated by a number of features of muskrat

1 trapping. First of all it can be caught by members of
2 the trapper's family while the trapper is away on his
3 lines which may be for a number of months. That is
4 one way in which the muskrat and the marten and
5 smaller animals, the squirrels and hares achieve
6 an importance beyond the economic value of the
7 muskrat. In other words, do you agree with that?

8 A Yes.

9 Q Yes, and in another
10 way, these animals can be caught, say, as early
11 as October when the cash from the trapper's, from the
12 family's employment income of last winter on a
13 pipeline, for example? Or the income from fine fur
14 trapping of the previous winter has been exhausted?

15 A Well, if you are talking
16 about muskrat, the fall take of muskrat is usually
17 restricted to what we call salvage operations and
18 in fact it is the fine furs that are usually caught
19 in that period.

20 Q Now, what I am getting
21 at, is should that be so, in other words shouldn't
22 game management schemes be devised to fit into the
23 life cycle or the yearly economic cycle of the
24 natives that do the trapping? You see, as I understand
25 it --

26 A Okay, in an academic
27 sense it should be tied to the resource base, and
28 then whoever uses that resource base should use it
29 intelligently and left to their own devices they
30 generally will.

N.S. Novakowski
Cross-Exam by Ryder

1 Q You see, as I understand
2 it we have the harvesting of muskrats and pipeline
3 employment, although in different times of the
4 year, they both form part of the potential elements
5 of the subsistence cycle of the northern people,
6 and what I am suggesting to you is that game management
7 which regulates one phase of that cycle, that is the
8 harvesting of muskrat, should be so designed to
9 permit the harvesting of muskrats at a time when
10 they are not engaged in other activities.

11 Can I have your comments
12 on that?

13 A Yes. First of all
14 I think that it is quite evident that the pipeline
15 or the construction phase will set its own initiative
16 and its own momentum and not be responsive to
17 seasons, wildlife seasons, or trapping seasons, and
18 for that matter they will definitely be restricted
19 as to the time in which they can operate, I would
20 assume. Whereas, the total trapping season, if you
21 are looking at it from the total integration of the
22 resource base is available throughout, for
23 example, say, the winter period, so that, there -- I
24 don't think that there is any way in which you could
25 intelligently do both jobs from the standpoint of
26 utilizing the total resource base. You may be able
27 to concentrate on one species or another and it
28 may not necessarily be muskrats.

29 Q I see. Well, the
30 reason I raise the point and I won't pursue; it is just

N.S. Novakowski
Cross-Exam by Ryder
Re-Direct

1 that construction activities on the pipeline may be in
2 an early November, as I understand it --

3 A Mm-hm.

4 Q And that is when
5 muskrat season begins, and I am just putting
6 the proposition to you that perhaps the muskrat
7 season should be advanced a month, so that we can
8 bring these various economic activities into harmony
9 with one another.

10 A The muskrat season,
11 per se, if you are talking about seasons being
12 set, they are being set by administrators. The
13 real proof of the pudding is to utilize the muskrat
14 when he is at his primest, and that may not be
15 November.

16 Q I am told that it is
17 hard to tell, but I won't belabour that.

18 MR. RYDER: Thank you,
19 Mr. Commissioner, thank you, Dr. Novakowski.

20 THE COMMISSIONER: Any
21 re-examination?

22 MR. ANTHONY: Yes, I have
23 just one question.

24 REDIRECT EXMAINATION BY MR. ANTHONY:

25 Q Dr. Novakowski, in
26 his cross-examination Mr. Lutes referred you to
27 page 20 and the discussion of the Dolomite,
28 Campbell Lake IBP site and the Caribou Hills site
29 and your comment that Arctic Gas might be impinging
30 on the Campbell Lake site and I think that Mr. Carter

N.S. Novakowski
Re-Direct

1 then clarified that in fact both of them would be
2 impinging on the Campbell Lake site. Your attention
3 was not directed toward the Willowlake site, and
4 in your evidence I think you indicated that the
5 Arctic Gas route passes through the proposed monitoring
6 area in the Willow Lake site. Can you tell us
7 whether or not the Foothills alignment also traverses
8 that site?

9 A Looking at the map
10 which, very unfortunately I saw only for the first
11 time today, they both do.

12 Q So to that extent the
13 alignments -- with respect to the impact on the
14 Willow Lake line, the two alignments appear to
15 traverse the same area?

16 A Yes, from my standpoint
17 I would grade them not of equal magnitude. That
18 is from the standpoint of rare and endangered species,
19 for example, but certainly from the standpoint
20 of IBP as a monitoring site, yes.

21 MR. ANTHONY: Thank you,
22 I have no further questions.

23 MR. LUTES: Mr. Commissioner,
24 could I just clarify something, whether it is the
25 actual alignment or the location of borrow areas
26 which have been referred to?

27 THE COMMISSIONER: Go ahead.
28
29
30

N.S. Novakowski
ReCross-Exam by Lutes

1 RE-CROSS-EXAMINATION BY MR. LUTES:

2 Q Could you clarify that
3 for me?

4 A Which one, in relation
5 to which one, the Dolomite-Campbell Lakes?

6 Q Well, I am just confused
7 by both of them because as I understand it, neither of
8 the alignment of either the CAGPL pipeline or the
9 Foothills pipeline actually traverse the I.B.P. sites;
10 but in each case there are borrow sites located within
11 the I.B.P. boundaries. Am I incorrect in that?

12 A O.K., I'm talking in
13 relation to the Willow Lake site, the monitoring site
14 rather than the I.B.P. site itself, which is south of
15 that.

16 Q The Willow Lake monitoring
17 site which is south and that was --

18 A The I.B.P. site.

19 Q -- the I.B.P. site
20 which was referred to by Mr. Peterson this morning.

21 A Yes.

22 Q And that's what you're
23 referring to.

24 A Yes.

25 MR. LUTES: O.K., that's fine.

26 THE COMMISSIONER: Just one
27 matter, Dr. Novakowski. These species classified as
28 rare and endangered and so forth, take the peregrine
29 falcon, is the -- does the peregrine falcon exist in
30 the -- in any other part of the world? You were talking

N.S. Novakowski

1 about North America --

2 A Yes.

3 Q -- and I take it you
4 meant the western hemisphere.

5 A Yes.

6 Q What about the eastern
7 hemisphere?

8 A Well, the so-called true
9 peregrine, falco peregrinus, has been endangered for
10 a long time. That is particularly in Europe. It was
11 distributed into the Near East and as far north as
12 the Finoscandia, and in fact there are only very few
13 known nesting sites left in Sweden. That's perhaps the
14 only place where any natural populations still exist,
15 and to my knowledge that -- there are less than 12 pairs.

16 Q Well --

17 A So it's even worse than
18 ours.

19 Q -- I see; but when you say
20 these species are rare and endangered, you're saying
21 that insofar as their habitat lies within our control,
22 within the geographic limits of Canada they are rare
23 and endangered, though they may exist in other parts
24 of the world.

25 A M-hm. They exist in
26 a different form. In other words, a different sub-species.

27 Q Oh yes. That was the
28 peregrine falcon. Take the Eskimo curlew that you say
29 may well be extinct in Canada.

30 A Yes.

N.S. Novakowski

1 Q Does it exist now anywhere
2 else in the world?

3 A No.

4 Q Well, if you'll just allow
5 me a moment to go through these with you then. What
6 I'm getting at is this. People who aren't experts in
7 the field and don't belong to the Wolf Defenders League
8 of Toronto and so forth, but are just the man on the
9 street; they may feel that we have some obligation
10 to do what we can to enable a species to survive here
11 as creatures who have a right to live as a population,
12 as a species, but if you describe a species as rare and
13 endangered and then it turns out that there are millions
14 of them in Siberia and we were just talking about
15 Canada, the man in the street may feel that we haven't
16 been altogether frank with him on the subject, is what
17 I'm getting at.

18 A Yes.

19 Q The other species that
20 you mentioned here, certainly the furbearing species
21 would all exist, I take it, or at least a sub-species
22 of the same species would exist in many other parts of
23 the world. Would that be so with respect to the fur-
24 bearers?

25 A Yes, and in other parts
26 of Canada too.

27 Q And the polar bear and
28 the grizzly the same remarks would apply?

29 A Yes, the brown bear is
30 distributed across and around the world.

N.S. Novakowski

1 Q All right, but take the
2 barren ground grizzly and without going into the ques-
3 tion of taxonomy, they exist on the barren grounds in
4 the Western Arctic currently.

5 A Yes.

6 Q Presumably in the Eastern
7 Arctic as well, I don't know whether you indicated that
8 or not.

9 A Yes, into Keewatin.

10 Q And they would be found
11 as well in Siberia and Scandinavia, would they?

12 A No.

13 Q No?

14 A No.

15 Q The whooping crane, the
16 present North American population you discussed with
17 us, would they be the only birds of their species in
18 the world?

19 A Yes.

20 Q All right. The whooping
21 crane, the Eskimo curlew, and the peregrine falcon
22 were the birds that you were chiefly concerned with,
23 you dealt with the furbearing animals and the large
24 mammals, and I think we understand the position then
25 with respect to each. You must think that I'm
26 terribly ignorant on the subject, so if you feel you
27 want to make any comment about the remarks I've just
28 made, now is your chance, if you think it's intolerable
29 that someone like this should be chairing this
30 Inquiry, well that's out of bounds.

N.S. Novakowski

1 But anything else/^{as}perfectly all right.

2 A No, I think -- and I am
3 very pleased, Mr. Commissioner, to see you enunciate
4 what really is the basis of an endangered species pro-
5 gram, is that we can in fact tolerate the absolute
6 loss of any species on this earth, and I think that's
7 an overriding principle, and I am not being, I hope,
8 insulting to you that if you understand that, I hope
9 many other people understand that too.

10 THE COMMISSIONER: Well, thank
11 you very much, Dr. Novakowski. We've managed to finish
12 in time for you to catch your plane, and we know you're
13 very busy and I want to express my appreciation for
14 your attendance and for your fascinating discussion on
15 these species and may I also thank Dr. Peterson and
16 Mr. Zoltai again, who are still with us, for their
17 attendance and to say that I have certainly gained a
18 great deal from the evidence of all of you.

19 (WITNESS ASIDE)

20 THE COMMISSIONER: So I think
21 then we can adjourn until Monday at 1 P.M. in the after-
22 noon, and you will have another panel for us then, Mr.
23 Anthony?

24 MR. ANTHONY: Yes, Mr. Commis-
25 sioner, we expect to have a fish panel beginning Monday
26 and a caribou panel following that.

27 THE COMMISSIONER: Excellent.
Well, we stand adjourned then.

(PROCEEDINGS ADJOURNED TO DECEMBER 15, 1975)

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(Government
Publication)

MACKENZIE VALLEY PIPELINE INQUIRY

IN THE MATTER OF APPLICATIONS BY EACH OF

(a) CANADIAN ARCTIC GAS PIPELINE LIMITED FOR A
RIGHT-OF-WAY THAT MIGHT BE GRANTED ACROSS
CROWN LANDS WITHIN THE YUKON TERRITORY AND
THE NORTHWEST TERRITORIES, and

(b) FOOTHILLS PIPE LINES LTD. FOR A RIGHT-OF-WAY
THAT MIGHT BE GRANTED ACROSS CROWN LANDS
WITHIN THE NORTHWEST TERRITORIES

FOR THE PURPOSE OF A PROPOSED MACKENZIE VALLEY PIPELINE

and

IN THE MATTER OF THE SOCIAL, ENVIRONMENTAL AND
ECONOMIC IMPACT REGIONALLY OF THE CONSTRUCTION,
OPERATION AND SUBSEQUENT ABANDONMENT OF THE ABOVE
PROPOSED PIPELINE

(Before the Honourable Mr. Justice Berger, Commissioner)

Yellowknife, N.W.T.

December 15, 1975.

PROCEEDINGS AT INQUIRY

Volume 103

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M835
Vol. 103

CANADIAN ARCTIC
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APPEARANCES:

Mr. Ian G. Scott, Q.C.,
Mr. Stephen T. Goudge,
Mr. Alick Ryder and
Mr. Ian Roland for Mackenzie Valley Pipeline
Inquiry;

Mr. Pierre Genest, Q.C.,
Mr. Jack Marshall, and
Mr. Darryl Carter for Canadian Arctic Gas
Pipeline Limited;
Mr. Reginald Gibbs, Q.C.,
Mr. Alan Hollingworth &
Mr. John W. Lutes, for Foothills Pipe Lines Ltd.;

Mr. Russell Anthony &
Pro. Alastair Lucas for Canadian Arctic Resources
Committee;

Mr. Glen W. Bell and
Mr. Gerry Sutton, for Northwest Territories
Indian Brotherhood, and
Metis Association of the
Northwest Territories;

Mr. John Bayly
or
Miss Leslie Lane for Inuit Tapirisat of Canada,
and The Committee for
Original Peoples Entitle-
ment;

Mr. Ron Veale and
Mr. Allen Lueck for The Council for the Yukon
Indians;

Mr. Carson H. Templeton, for Environment Protection
Board;

Mr. David Reesor for Northwest Territories
Association of Municipal-
ities;

Mr. Murray Sigler for Northwest Territories
Chamber of Commerce.

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Yellowknife, N.W.T.

December 15, 1975.

(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

MR. MARSHALL: I should perhaps mention while we're waiting for Mr. Anthony that I have two reports that have recently been completed that are now available in our library. The first is Northern Engineering Report,

"Pipeline related borrow studies cross-delta alternative route, east of Fort Simpson re-alignment."

The second is:

"Aviation Weather Study, Prudhoe Bay to Shingle Point,"

done by Avcon Consultants Limited.

MR. RYDER: Mr. Commissioner, while we're on the subject of reports, I have here in draft form a report that we were discussing last week, the Surrende & DeBock Report. The authors of that report are Almer DeBock, Dennis Surrende and Malcolm Dennington, and I have it here to file in draft form but I would like -- the authors have asked me to make the following reservations or observations in filing it.

The first is that the report is still in draft form and it is not being released, in other words, with the blessing of the Canadian Wildlife Service, which it likes to dot every "i" and cross every "t" before doing so. The original draft, I think, was and some 300 pages in length/has, in draft form, been quoted

Stein, Walker, Steigenberger, Millen
In Chief

1 in other reports that are before you. I think for
2 example the PAAG Report refers to a former earlier
3 edition of the document I wish to file; but subject
4 to the observation that it is still in draft form
5 the authors tell me that the body of the report and the
6 conclusions reached are not likely to be revised, and
7 that it may in that sense be of some value to the Inquiry.
8 So if I could file it now and then take it away from
9 Miss Hutchinson so that it can be copied and distributed.

10 THE COMMISSIONER: All right,
11 we'll do that. Well, can we come to order and begin
12 now? Are we all set?

13 MR. ANTHONY: Yes, Mr. Commis-
14 sioner. You have before you this afternoon the panel
15 on fish resources being presented by the Canadian Arctic
16 Resources Committee as part of their Phase 3 evidence.
17 The panel from the gentleman closest to you on the right
18 is Mr. Jeff Stein; next to him, Mr. Chuck Walker; next,
19 Mr. Lance Steigenberger, and Mr. John Millen, and I'd
20 like to introduce their qualifications and experience
21 to you before they present their evidence.

22
23 JEFFREY N. STEIN,
24 CHARLES EDWARD WALKER,
25 LANCE WILLIAM STEIGENBERGER,
JOHN M. MILLEN, sworn:

26 DIRECT EXAMINATION BY MR. ANTHONY:

27 Q Mr. Stein, perhaps we
28 could start with you. Your qualifications and experience
29 have been circulated as a biographical note with your
30 evidence. Would you please summarize your educational
experience and qualifications to the Inquiry?

Stein, Walker,
Steigenberger, Millen
In Chief

WITNESS STEIN:

A Yes. I received my
Bachelor of Science degree in Fish & Wildlife Management
from the University of New Hampshire in 1968. Subsequent
to that I received my Master of Science degree in Fisheries
Biology from the University of Washington in 1970.

Between 1971 and 1972 I was
employed as the area biologist -- project biologist,
rather, Fisheries & Marine Service, with the Mackenzie
Valley Pipeline project. From 1972 to '75 I was the
project manager for that program, Fisheries & Marine
Service again. From early 1975 to the present I
assumed the position of acting division head, Fisheries
& Marine Service, Winnipeg.

Q And you are the author or
co-author of reports listed on your biographical note.

A Yes, I was.

Q Mr. Commissioner, Mr.
Stein's biography, list of reports and statement of
evidence should be filed as an exhibit.

Mr. Walker, would you please
summarize your education and experience as circulated
in the biographical note sent with your evidence?

WITNESS WALKER: I received
my Bachelor of Arts degree in Zoology, University of
British Columbia, in 1949. I carried out post-graduate
studies in fisheries, oceanography, statistics at the
University of Washington in 1950 to 1958. I am presently
the senior biologist, Northern British Columbia & Yukon
Division, Fisheries & Marine Service, Department of

Stein, Walker
Steigenberger, Millen
In Chief

1
2 Environment. My responsibilities are to develop objec-
3 tives and decide biological studies around those objec-
4 tives, to assign personnel and funds, to guide program
5 implementation and assess data quality and orientation to
6 objectives, to oversee and/or participate in the prepara-
7 tion of reports, and to advise the chief of the division
8 on all matters relating to biology.

9 My professional affiliations are
10 Canadian Society of Environmental Biologists, Pacific
11 Fishery Biologists.

12 Professional experience, from
13 1949 to 1959 I worked on contract research at the
14 University of Washington for the Alaska Salmon Industry.
15 From 1959 to present I've been with the Government of
16 Canada, Fishery, Pacific Region, Vancouver.

17 From 1968 to 1971 I was involved
18 in inventory of aquatic resources on the Pacific Coast,
19 and from 1971 to the present I've been involved in
20 environmental studies on pipeline -- that's the North
21 Yukon -- and hydroelectric development (Aishihik,
22 Whitehorse and Minto) and resource assessm ent in the
23 Teslin Watershed and Yukon River proper.
24
25
26
27
28
29
30

Millen, Steigenberger
Walker, Stein
In Chief

1 Q You are the author,
2 co-author of the three pages of reports that were
3 listed with your biographical note?

4 A Yes, sir.

5 MR. ANTHONY: Mr. Commissioner,
6 Mr. Walker's biography and statement of evidence is
7 also tabled.
8
9

10 MR. ANTHONY: Mr. Steigen-
11 berger, would you please provide the Inquiry with
12 your qualifications and educational experience.

13 WITNESS STEIGENBERGER: I
14 obtained my Bachelor's Degree in zoology specializing
15 in wildlife management from the Univeristy of British
16 Columbia in 1966. Subsequently I enrolled as a
17 graduate student, taught first and third year science
18 students and completed both a teaching certificate in
19 Education in 1971 and a Masters Degree in Fisheries in
20 the Spring of '72. Having completed research
21 principally orientated to my thesis I joined the
22 staff of the Fisheries Service in February 1972. At
23 that time I was assigned to pipeline related studies
24 in the Northern Yukon Territoy. I initally provided
25 technical data and was subsequently re-classified to
26 a biologist responsible for the design and execution
27 of the fisheries studies. I also acted as a point of
28 contact on environmental considerations within the
29 Northern Yukon Territory.
30

Since November 1st, 1975, I

Millen, Steigenberger
Walker, Stein
In Chief

1 have been employed in the Fisheries Research Division
2 of Fish and Wildlife Branch, Government of British
3 Columbia at the University of British Columbia.

4 Q And you are author or
5 co-author of reports of publication s listed with your
6 biographical note?

7 A Yes, I am .

8 Q Similarly, the list of
9 publications, the reports referred to in the statement
10 of evidence will be filed as an exhibit.

11
12 MR. ANTHONY: Mr. Millen, now
13 would you indicate to the Commissioner your education and
14 experience.

15 WITNESS MILLEN: Yes, I
16 received my Bachelor of Engineering Degree in Civil
17 Engineering from the University of Auckland in New
18 Zealand in 1959. I am currently a member of the
19 New Zealand Institution of Engineers, the Association
20 of Professional Engineers of B.C. and the Canadian
21 Society of Civil Engineering. I will just go through
22 my experience in the reverse order to what is shown
23 in the biographical note.

24
25 From in November 1959 to
26 February 1956 I was engineer with the Ministry of
27 Works in New Zealand, working on the design and con-
28 struction of municipal services and hydroelectric
29 design and stream surveys.

30 From November of 1962 to
February 1963 I was the leader of the Federated Mountain

1 Clubs of New Zealand Tararva Antarctic
2 Expedition which was a summer field expedition
3 making land surveys and geological reconnaissance in
4 the Antarctic.

5 From March 1965 to December
6 1965 I was a field engineer with a construction
7 firm based in Sydney Australia on a bridge construction
8 contract.

9 From June 1966 to August 1967
10 I was engineer with the Resource Development Branch
11 of the Fisheries Service in Vancouver, B.C., working
12 on the design and construction of Pinkut Creek
13 Spawning Channel on Babine Lake.

14 From September 1967 to September
15 1969 I was Development Engineer working on similar
16 kinds of work in the east coast Resource Development
17 Branch, Fisheries, in Halifax, Nova Scotia.

18 From October 1969 to September
19 1970 I was assigned to the Resource Development
20 Branch, Fisheries Service in Ottawa, working, assisting
21 with the review of Fisheries Act amendments and
22 Federal pollution control legislation, and then I
23 returned to Halifax and continued the work there. In
24 April 1971 to June 1975 I was the head of the
25 Resource Impact Division, Resource Management Branch
26 of Fisheries and Marine Service in the Central
27 Region, Freshwater Institute in Winnipeg, Manitoba.
28 The work there comprised the investigation of fish
29 resources and the effects on them of industrial
30 development and the protection of fish habitats. The

Millen, Steigenberger
Walker, Stein
In Chief

1 projects managed in that division included the Macken-
2 zie Valley Pipeline studies, the Mackenzie Highway and
3 Churchill/Nelson Basin Studies. That job
4 included, prior to January 1973, supervision
5 of an aquatic toxic studies unit, which developed
6 methodology and limits for bioassays for inclusion in
7 Effluent Regulations, and also, prior to November 1972
8 included pollution control functions of the Fisheries
9 Service under the Fisheries Act for the Central Region.

10 My present position as
11 Senior Engineer with Ecological Protection Group of the
12 Environmental Protection Service in the Pacific
13 Region, Vancouver, with Environment Canada where I am
14 responsible for co-ordinating environmental design
15 inputs into some larger resource development projects.

16 Q And you were the author
17 and have been involved in the publications listed with
18 your biographical note?

19 A Yes, I am.

20 MR. ANTHONY: Mr. Commissioner,
21 Mr. Millen's biographical note, list of reports and
22 evidence is similarly filed as an exhibit.

23
24
25 MR. RYDER: Mr. Commissioner,
26 as you have heard, all of these witnesses, except
27 for Mr. Steingenberger are employees of the Federal
28 Government, and Mr. Steigenberger, as you know is an
29 employee of the Government of British Columbia and it
30 is understood that their evidence represents their own

Millen, Steigenberger
Walker, Stein
In Chief

1 personal views and not the policy of any government.

2 MR. ANTHONY: Mr. Stein if we
3 could then return to you. Would you please describe
4 the operation and objectives of the Mackenzie pipeline
5 project that you were involved in?

6 WITNESS STEIN: Fisheries and
7 Marine Service investigations, fish
8 resources along the proposed Mackenzie Pipeline route
9 were initiated in 1971 under the auspices of the
10 Environmental Program, Northern Pipelines. The Yukon
11 Territory lies within the Pacific Region of the
12 Service and studies here are operated from
13 Vancouver and Whitehorse.

14 The Mackenzie Valley is
15 included in the western region, headquartered in
16 Winnipeg and it is to this area that any specific
17 comments in this testimony will refer.

Stein, Walker
Steigenberger, Millen
In Chief

My affiliation with the Mackenzie Pipeline project began in 1971 at which time I was area biologist, operating from Fort Simpson. In 1972 I initiated operations in Aklavik after which I assumed the responsibilities of project manager. From this point on I was personally involved in planning project objectives, periodic field inspections, writing and editing reports and overall project supervision. The responsibility for the scientific approach, analysis of data and preparations of reports lies with the senior authors of each report.

Initial project operations were conducted from three base camps along the Mackenzie Valley, Fort Simpson, Norman Wells and Arctic Red River. In 1972, a fourth base was established at Aklavik. Field crews operated within an approximate radius of 60 miles from each base, establishing sampling locations in the Mackenzie River itself, as well as all major tributaries in the area. During 1971 and 1972 synoptic helicopter surveys were conducted on all major tributaries of the Mackenzie including at least the headwater regions of streams being investigated from the river bases. Site specific information was also collected through a series of intensive stream studies.

Resource data obtained from the Mackenzie Pipeline project were supplemented by several other impact studies conducted by Fisheries & Marine Service, relating to the Mackenzie, Liard and Dempster Highway projects, the proposed hydro-electric development of the Great Bear River and Mackenzie Delta

Stein, Walker
Steingenberger, Millen
In Chief

1 exploratory drilling -- that is the Beaufort Sea
2 project.

3 Briefly, the objectives of the
4 four-year project were to:

5 (1) To define the biology and life histories of all
6 major fish species inhabiting the Mackenzie system,
7 including factors such as age composition, growth rates,
8 species composition and distribution and food habits.

9 (2) To determine the timing of fish migrations and
10 the major migratory routes used.

11 (3) To locate and define critical habitat areas for
12 each species including areas utilized for spawning,
13 rearing, feeding and over-wintering purposes.

14 (4) To identify areas normally fished domestically and
15 to obtain an estimate of the quantities of fish taken.

16 Project results have been
17 presented in a series of reports to the Environmental
18 social program which are listed as an appendix to this
19 statement. In addition, I co-authored a report entitled:

20 "Guidelines for the protection of the fish resources
21 of the Northwest Territories during Highway
22 Construction and Operation."

23 These guidelines have been issued by Fisheries & Marine
24 Service and apply to the Mackenzie Valley region.

25 Q Mr. Commissioner, a copy
26 of that report is filed as an exhibit. There's also
27 a copy available on your desk, and I have about four
28 or five other copies if other counsel or other people
29 would like to have a copy for their own use.

30 Mr. Stein, would you now discuss

Stein, Walker
Steinberger, Millen
In Chief

1 some specific concerns that you feel must be addressed
2 to provide maximum protection to aquatic environments?

3 A My greatest concern is
4 that we do not not possess sufficient environmental
5 knowledge to ensure protection to all fish resources
6 nor are we likely to in the time frame being considered.
7 Certainly we can identify the more significant popula-
8 tions and in some cases provide very specific measures
9 for their protection. But for the vast majority of
10 streams, especially small drainages, data are generally
11 limited, thus requiring extrapolation from more
12 intensively studied and hopefully similar watersheds.
13 As a result, some of the concerns and recommendations
14 I will present may appear highly conservative. In some
15 instances they are. But I consider it imperative that
16 every effort be made to afford maximum protection to
17 the resource as a whole, a resource whose utilization
18 and value will increase substantially as development
19 in the Mackenzie Valley continues.

20 These concerns are then:

21 (1) Stream crossings. One of the most potentially
22 serious threats to the productivity of aquatic ecosystems
23 posed by the construction of pipeline stream crossings
24 is increased levels of suspended sediment. Impact
25 severity will be dependant on several factors including
26 the time of year, composition of river bed and bank mater-
27 ials, stream discharge rates, composition and sensitivity
28 of fish and benthic populations, and the amount and
29 proximity of critical habitats.

30 In his discussion of stream

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1 crossings, the applicant has defined minor crossings
2 as those having little or no significant flow during
3 winter conditions, when construction would occur.
4 However, even relatively small flows may be critical
5 to the survival of the aquatic resource. Stream gravels
6 may contain the incubating eggs of fall spawning species
7 including the white fishes, ciscos, inconnu, and Arctic
8 char. Overwintering freshwater fish populations are
9 restricted to open water areas, deep pools or lakes.
10 These situations are dependent upon constant water flows
11 which may potentially be blocked or diverted by the
12 formation of a frost bulb or an open, frozen trench.

13 The problem during winter
14 construction will be to identify critical habitats such
15 as egg incubation or fish overwintering areas prior to
16 construction. The efforts of both government and the
17 applicant have identified fish overwintering areas in
18 several streams, including the Ochre and
19 Willowlake Rivers, and Hodgson Creek. I had initially
20 included the Great Bear River in this list, but on fur-
21 ther checking our data I realized that it had not been
22 identified as such. During our winter surveys conditions
23 appeared to be more than favorable for overwintering,
24 including good flows, open water areas, and sufficient
25 levels of dissolved oxygen. However, conditions at the
26 time did not permit us to sample fish and verify over-
27 wintering. The locations of specific spawning beds,
28 however, are considerably less known. The problem is
29 further compounded by the paucity of data concerning
30 stream conditions under ice, especially the existence

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1 of sub-gravel flows and the difficulties in determining
2 the reliability of the data that does exist. Frequently
3 conditions exist at stream sites that indicate they
4 may be frozen to the bottom one year, and flowing
5 freely the next. I could use the Ochre River as an
6 example of this. The area studied was actually about
7 one-quarter of a mile downstream from the crossing
8 point, the point which the applicant had previously
9 described as being frozen to the bottom. However,
10 I think as a general statement, the above still holds
11 true. Considerable weekly variation in flow condi-
12 tions have also be observed during the winter.

13 Because of such variability
14 in stream flow conditions from year to year and
15 difficulties in determining under ice conditions down-
16 stream from the crossing site, it is recommended that the
17 applicant prepare two techniques for minor stream
18 systems:

- 19 (1) utilizing standard trenching techniques for streams
20 frozen to the bottom and where sub-gravel flows do not
21 exist;
22 (2) the other incorporating special sediment controls
23 and measures for en suring the unrestricted flow of
24 fresh water to downstream areas, for streams with running
25 water.

26 The preconstruction drilling
27 program and on-site inspections should assist in deter-
28 mining which method would be used, but the final choice
29 of crossing techniques must be made on site.
30

Construction of a gas pipeline and ancillary facilities such as roads, airstrips and pumping stations will require considerable quantities of granular materials. Although sources of these materials have been surveyed, the Applicant has stated that known terrestrial supplies will not meet expected needs and that alternative sources will be sought, specifically, stream gravels from the active flood plain.

From the point of view of protecting the aquatic environment and its resources, the extraction of stream gravels should be avoided wherever possible. Fisheries and Marine Service GUIDelines for the Protection of the Fish Resources of the Northwest Territories during Highway Construction recommend that gravel removal operations be limited to areas above the design flood high water stage and no closer than 300 feet from any active channel, and I would recommend that these apply to pipeline construction also.

However, should alternative gravel sources not be available, certain stream deposits

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might be exploited with limited environmental disruption provided the operations are conducted in a controlled manner. General rules for such operations might include:

1. Removal operations should be conducted during time periods least sensitive to the aquatic environment.
2. Removal operations should not take place within the wetted margin of the stream at the time of extraction.
3. Gravel should not be removed from below the existing water level of the main channel. This should reduce the need for a berm and, therefore, limit disturbance of the area.
4. All removal operations should be graded as closely as possible to original levels so as not to entrap fish during period of receding water.
5. All removal operations should be approved in advance and closely monitored by a Fishery Officer or similar environmental inspector independent of the Applicant.

A major concern in considering the removal of stream gravels is that, in general, detailed information on individual streams and the use made of these streams by the fish resource is usually deficient or lacking. That is particularly true in the case of defining specific spawning areas within a system. For this reason, stream gravel removal operations should be permitted on an individual basis subject to the applicant's providing:

1. The location of the proposed borrow source;
2. The timing of removal operations;

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3. The surface area, depth of extraction and volumes involved;
4. A biological and hydrological description of the system including habitat analysis; and
5. An assessment of the expected biological and hydrological impact resulting from gravel removal.

Concern Number 3 is water use. The applicant will require considerable volumes of water from numerous lakes and streams along the right-of-way for pipeline testing, construction of snow and ice roads and camp use. Much of this water will be drawn from shallow fishless lakes until such time as they freeze to the bottom and thereafter from deeper lakes. Additional supplies may then be taken from streams or portions of streams which remain flowing during the winter.

Few fish-related biological problems are likely to result from extracting water from fishless lakes. This may also be the case in deeper lakes depending in part on the depth of lakes, the degree of water level drawn down and the utilization of the lake by fish. If shallow waters are used for feeding or spawning purposes, a significant change in water levels could result in the total loss of favourable habitats.

Perhaps even more sensitive is the removal of water from rivers or streams, especially under winter conditions. Northern fish species seek out deep rivers or lakes for overwintering habitat, or else pools or open water areas in smaller streams. In the latter instance, large numbers of fish

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may be congregated in a relatively small area with limited water flows. Escape from such areas may be blocked by ice buildup above and below the pool. Therefore, any disruption to either the quantity or quality of the water supply could have serious consequences.

When assessing potential water resources, especially from streams, consideration must be given to the use made of the system for spawning purposes. The eggs of fall spawning species, including the whitefishes, ciscos and Arctic char, remain buried in stream gravels throughout the winter months, hatching in spring. The water covering these eggs may be limited to sub-gravel flows and water extraction could leave much of the spawn stranded.

For these reasons it is recommended that water sources be permitted on an individual basis subject to the applicant:

1. Identifying the proposed source, the volumes required and the time period over which water will be extracted;
2. Conducting thorough biological and hydrological investigations of each system, especially under winter conditions;
3. Providing documented proof that lakes indicated as being fishless are indeed not utilized by the fish resource at any time of the year, and
4. Predicting the biological and hydrological implications of water extraction from each system. This would include information such as the anticipated effect on the water level, whether any spawning areas would be

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exposed and other similar habitat evaluations.

Concern number 4. Utilization of fish resources by pipeline personnel. Northern fish are characteristically slow growing. This slow rate of growth, coupled with increased age at maturity, can result in long recovery periods for populations if their numbers are severely reduced.

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Although pressure is increasing on the fishery resource for both sport and commercial purposes, the greatest utilization is still through the domestic fishery. Even now the domestic utilization of Arctic char in the Big Fish River is threatening population stability. Increased fishing pressure in this river, be it for domestic or sport purposes, would not only further reduce stock size but could jeopardize an important food source for local peoples.

The applicant has stated that fishing by pipeline personnel will not be permitted as a matter of corporate policy. However, such a policy is only as good as its enforcement. Government cannot deny the sale of fishing licences to anyone meeting the criteria of the Fisheries Regulations. Policy enforcement is the critical factor and it is recommended that the applicant include discussions of resource protection in personnel education programs carried out prior to entering the field. Critical points should be reinforced through posters distributed in field camps. The applicant should bring Territorial Fisheries Regulations to the attention of his employees, and note that local fish stocks are not to be used for feeding construction personnel and that the sale or trading of fish is illegal unless the fish have been caught under the authority of a commercial licence.

Concern No. 5, culvert stream crossings. In response to the deficiency statement issued by the Pipeline Assessment Group, the applicant has stated that:

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1 "Only five streams are planned to be crossed

2 by permanent roads constructed by the applicant."

3 All of these streams occur in the Northwest Territories
4 and three of the five are indicated as having or probably
5 having significant fish activity. Whatever number of
6 stream culverts are actually required, each will have
7 to be designed on a site specific basis.

8 The only criteria for culvert
9 design is that used by the Department of Public Works.
10 However, the Fisheries & Marine Service highway
11 construction guidelines in the Northwest Territories
12 recommend in part that:

13 "A 7-day impassable period (for culverts) should
14 not be exceeded more than once in the design
15 period of 50 years. A 3-day impassable period
16 should not be exceeded during the average annual
17 flood, defined as a flood having a recurrence
18 interval of 2.33 years,"

19 and that,

20 "...the average cross-sectional velocity through
21 any culvert section shall not exceed 0.9 meters
22 per second (3 feet per second) during fish
23 migration periods, unless it can be satisfactorily
24 demonstrated that the culvert design includes a
25 selected region wherein velocities are low
26 enough to permit fish passage."

27 I would recommend these standards also apply for
28 culverts used in pipeline-related activity.

29 No. 6, construction timing.

30 Although the life histories of a number of fish species

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1 in the Mackenzie system are known in some detail,
2 the data available for others is far from complete.
3 Studies have shown that there are significant annual
4 variations in timing in migrations, spawning periods,
5 hatching and emigration of fry and that the variations
6 also exist over the geographic range of a species.
7 Factors contributing to these changes include water
8 temperature, ice breakup and stream flows.

9 A general observation has been
10 that the timing of such activities usually varies by
11 approximately two weeks between the northern and south-
12 ern reaches of the river. For example, spring spawning
13 may begin two weeks later in the area of the Mackenzie
14 Delta than it does near Fort Simpson while fall spawning
15 may occur two weeks earlier.

16 The critical period for fall
17 spawning species appears to be September 1 to November
18 15, and May 1 to July 15 for spring spawning species.
19 As a general rule, instream construction activities
20 should be avoided during these time periods. However,
21 each system should be judged individually before
22 proceeding and in circumstances where it can be shown
23 that there would be no detrimental effect on the fish
24 resource, construction could proceed even during these
25 periods.

26 Q Mr. Stein, would you
27 identify the stream systems where fish resources are
28 biologically sensitive to pipeline construction, and
29 indicate your concerns?

30 A A list of stream systems

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1 in which the fish resources are likely to be sensitive
2 to construction activities was presented by Stein and
3 others in the environmental social program 73-1,
4 Jessop and others, environmental social program 74-7,
5 and Jessop & Lilley, 1975. My technical report is as
6 yet unpublished.

7 Q Mr. Commissioner, that first
8 publication, ESP-73-1 is Exhibit No. 377 in this Inquiry,
9 the second one, ESP-74-7, is Exhibit No. 378; and the
10 third one, the Jessop & Lilley new report, as yet
11 unpublished, is hereby tabled and will be the next
12 exhibit number, and again I have a few copies that
13 are available for others.

14 I think we may have to ask
15 counsel to accommodate each other by sharing. This
16 report, as indicated, was not published and we were
17 able to get the most up-to-date copy of it and make
18 it available, and I think one is left with me and
19 I will try to leave that in the Resources Building
20 Library.

21 Please continue, Mr. Stein.

22 A Sensitivity here was
23 based primarily on the biological fragility of the
24 resource as well as the significance of fish populations
25 to existing or potential fisheries. It was recommended
26 that the systems listed be avoided by any pipeline
27 routing. Should avoidance be deemed impossible, firm
28 restrictions on construction scheduling, stream crossing
29 techniques and silt retention methods should be imposed.
30 Stream systems listed were the Mackenzie River Delta,

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1 Big Fish, Rat and Trout Rivers, and Jean Marie Creek,
2 the Peel, Arctic Red, Great Bear Rivers, and the Swan
3 Lake Creek and Three Day Lake-Stewart Creek drainages,
4 Hare Indian River and the Willowlake River.

5 This was not meant to be an
6 all-inclusive list nor was it meant to subordinate
7 the importance of river systems from which insufficient
8 data has been collected to determine if significant
9 populations exist. Included in this category are several
10 systems which may be extremely sensitive to winter pipe-
11 line construction since they contain fish during the
12 winter. These are the Rabbitskin, Liard and Martin
13 Rivers, River Between Two Mountains, Hodgson Creek,
14 Ochre River and Oscar Creek. In addition, many small
15 clear streams are significant spawning nurseries and
16 overwintering areas for Arctic grayling. Tributaries in
17 areas with many springs often contain open water and
18 conditions suitable for fish overwintering. Most of
19 these areas are located along the fringe of mountain
20 ranges where streams flow out of the Richardson and
21 Mackenzie Mountains on the west side of the Mackenzie
22 River valley and from the Franklin Mountains on the
23 east side between Camsell Bend and the Norman Wells
24 area. Control of construction routing, scheduling and
25 the use of special techniques should be imposed for all
26 tributaries in these areas of groundwater activity.

27 I would like to make one other
28 general observation. Our studies have indicated that
29 the mouths of essentially all Mackenzie River tributar-
30 ies are utilized by fish for various reasons during

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1 most times of the year. In some instances such as
2 the mouth of the Arctic Red River, we feel certain
3 that spawning does occur.
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It also appears that postspawning fish favour river mouths for feeding until conditions, such as decreasing water levels, force them to other areas. We also suspect river mouths to serve as nursery areas for emmigrating juveniles as well as overwintering areas where they do not freeze to the bottom. We have much better catch data to indicate the importance of river mouths as resting sites for anadromous species during migrations. Because fish do congregate in these or similar protected areas, it is only natural that this is where the domestic or commercial fisherman will set his nets.

My concern here is not for the location of pipeline crossings, since I think most crossings are located in a matter that should provide reasonable protection to the stream mouths. However, these sites appear to be preferred locations for support facilities such as wharfs, and staging areas presumably for reasons such as the availability of water and gravel supplies, protected mooring and improved accessibility to construction sites via river valleys. As a general recommendation, I would suggest that river mouths be avoided wherever possible. My colleague Mr. Millen will outline mitigating measures for situations where avoidance is not possible.

Q What is your view about the proposed use of methanol in pipeline testing?

A In my opinion, there should be considerable concern regarding the use of methanol as a freeze depressant during pipeline testing. Ideally, the risk of pipeline rupture during

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testing will be small. Nevertheless there is still a risk and I would expect containment and clean up to be difficult should a rupture occur in or near a water course.

Methanol is highly toxic to aquatic organisms. In his own work, the applicant has shown little or no effect to free swimming fish from a methanol concentration of one percent. However, the same concentration resulted in retarded development and premature hatching in the eggs of Arctic char and Arctic grayling. To my knowledge, similar studies have not been conducted on invertebrate organisms or under actual field conditions. Also, since winter testing will be carried out, methanol entering watercourses would do so at a time when flows and dilution would be limited and movements of fish restricted. It is also at this time that the eggs of several fish species, including Arctic char, the whitefishes, ciscos, inconnu and burbot, would be incubating in stream gravels.

In the absence of further data and research, the use of methanol for pipeline testing cannot be recommended from a fisheries point of view. If possible, the alternative testing technique discussed by the applicant, that is, the use of hot water, should be reconsidered. Providing that the test water is cooled, aerated and cleansed prior to disposal, little environmental damage should result. Otherwise, a freeze depressant which has been thoroughly investigated and demonstrated to be less toxic than methanol should be sought. At the same time, further research

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on the disposal of methanol into water must be undertaken and approval for the use of methanol should be withheld until these further studies have been completed.

Q What is your general evaluation of the East of Franklins Route alternative to a route down the Mackenzie Valley?

A I think it can be safely assumed that most of the fisheries concerns expressed in connection with the Mackenzie Valley proposal are equally relevant East of the Franklins. This includes factors such as resource exploitation, blockage of movements, water extraction, gravel removal, increased siltation and the possibility of toxic spills. A major concern has also been the protection of the Mackenzie Delta and the Franklins route is not likely to alter the requirements for major feeder line and gas plant developments in this area.

Two factors make the East of Franklins route appealing. In his evidence before this Inquiry, Dr. Roed pointed out that throughout the moraine belts along this route, granular deposits are common either in the form of glaciofluvial material or, in the south, sand and gravel of the beach strand lines. If this is the case, it would probably reduce, though not eliminate, the necessity of extracting stream bed gravels for construction purposes.

The second factor is that the East of Franklins route has considerably reduced the number of major stream crossings. According to Dr. Roed,

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only three such crossings would be required, these being the Kaguluk and Great Bear Rivers and the Mackenzie River near Fort Providence. However, there will still be several crossings of minor streams in the headwaters of rivers, and it is these areas that are most frequently favoured as spawning grounds.

It must be noted that our data base for most of these drainages is quite small, often being limited to an estimate of species composition. Obviously, further studies are required before an accurate assessment of the route can be made. However, based on the reduced number of stream crossings and the increased availability of granular materials, it is my opinion that construction of the East of Franklins Route would be potentially less disruptive to the aquatic resource than a similar line down the Mackenzie Valley, assuming factors such as construction techniques to be equal.

I am aware of the argument that the East of Franklins route may require longer access routes from staging areas on the Mackenzie River, however, much more detail is required before an evaluation of this aspect can be made.

Q What, in your view, are the long-range resource implications of the Mackenzie Valley gas pipeline?

A Through the efforts of both the Applicant and government, most potential short-term impacts to northern aquatic resources and environments, resulting from the pipeline project, have

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been identified. The general conclusion is that, provided proper precautions and procedures are incorporated and provided these procedures work, environmental degradation resulting from construction should be minor and of short duration. However, the potential for long-term impacts, arising both from the pipeline project itself and associated industrial and other developments, does exist.

For example, if a stream system is crossed by the pipeline, habitat disruption and losses to both invertebrate and fish populations will likely result from increased sedimentation. The severity of these losses will principally depend on the degree of caution exhibited in constructing the crossing, and in the success of stabilization efforts. If the crossing is well constructed, the ecosystem can be expected to stabilize over a relatively short time. A major problem which has not been considered in detail, is what long term environmental consequences will result if the crossing is not successful, such as slope or revegetation failure, pipe exposure, rupture and repair, etc. Nor to my knowledge has consideration or study been directed at determining what synergistic effects might result from subsequent developments such as crossing by another pipeline, a highway, possibly even a railway or hydro-electric transmission lines.

With the construction of a pipeline or any development of a similar scale, considerable numbers of people, either connected with the development itself or various ancillary businesses, will

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1 be moving north. At the completion of the project,
2 some may elect to remain in the north. As a result,
3 there will be new demands for water or for stream gravels
4 as sources of construction materials, resulting in a
5 reduction in the availability of suitable habitat for the
6 fish resource. Increased volumes of sewage and waste
7 will have to be disposed of. Increased handling,
8 storage, and use of oils, fuels and other
9 chemicals and toxicants will result in a higher incidence
10 of spills and pollution. There will also be a new
11 demand for the fish resource itself. Sport usage
12 will increase tremendously, especially with new
13 roads providing improved accessibility. With an expanded
14 market, requests will be made for larger commercial
15 catch quotas and new fisheries.

16 The pipeline project has
17 provided the impetus for initiating comprehensive
18 fisheries research in the north. Given that the
19 pipeline represents a major step in development of
20 the north, the Fisheries and Marine Service, in keeping
21 with its mandate, will need more data on complete nor-
22 thern aquatic ecosystems and how they might react to long
23 term implications as discussed above. In order to max-
24 imize benefits from aquatic ecosystems, activities will
25 have to be initiated or accelerated in the following
26 areas:

27 1. A continuing northern aquatic ecosystem program
28 must be established. Such a program should be developed
29 around the quantity and quality of existing data and a
30 geographical assessment of potential industrial develop-

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ment plans;

2. Biological monitoring programs should be established with all major development projects. Such programs should determine the effectiveness of environmental protection measures incorporated by the developer or recommended by government; and

3. Fishery officers or similar environmental inspectors independent of the applicant should be on site as the development proceeds to ensure that protection measures are adhered to and to alert the operator to unforeseen resource implications.

In my view, such further research combined with the authority and will to implement and enforce environmental protection measures is essential to ensure this project, or any project of similar magnitude, causes the least damage possible to the fisheries resources.

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Q Thank you, Mr. Stein.

Mr. Commissioner, I now propose to direct our attention more specifically to the Yukon where Mr. Walker and Mr. Steigenberger have done their work, and we'll start with you, Mr. Walker and ask you to provide us with a history of the pipeline related studies in the Yukon.

WITNESS WALKER: Yes, the assignment of personnel to the Mackenzie Valley Pipeline study was made on April 29, 1971 by Dixon MacKinnon, chief biologist, Pacific Region. On the following day, Mr. Len Cowley, chief, Resource Development Branch, Central Region, informed Pacific Region personnel of the presence of commercial quantities of hydrocarbons in Prudhoe Bay, Alaska, and of tentative proposals to ship these products to the central continent via oil and gas pipelines through Canada. Initially it was anticipated that an oil pipeline would be constructed first, followed by a gas pipeline two to three years later. At that time I, as acting project director, received a mandate to study the effects of pipelines on the fish resources in the Yukon Territory along two proposed routes. One route followed the coastal plain adjacent to the Beaufort Sea, and the second one crossed the Yukon interior, approximately 120 miles south of the coast. These routes are roughly the prime and interior routes proposed by Canadian Arctic Gas.

The field group departed for the study area on July 16, 1971 and both routes were studied in that year. From 1972 onwards, it was generally

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1 accepted that Prudhoe Bay oil would be transported
2 via TAPS within Alaska. Thus research efforts were
3 directed toward the construction of a gas pipeline in
4 the northern Yukon. In addition, during 1972 the
5 environmental social program indicated that the U.S.
6 Government favored a route that would proceed through
7 the interior of the Yukon Territory in order to avoid a
8 wildlife refuge in Northeast Alaska. Thus during 1972
9 field studies were directed towards the interior route.

10 Evaluation of the coastal
11 route was possible by the exchange of information
12 between government and industry. The raw data collected
13 by industry was available because it was a condition
14 in issuing a permit to collect fish samples. This
15 philosophy had been encouraged by the Environmental
16 Social Committee to avoid unnecessary duplication of
17 research; and fisheries, because of the permit system
18 there exists an exchange of research information.
19 During subsequent work, greater emphasis was placed
20 on specific pipeline crossing sites and major watersheds
21 along both routes. The research was coupled primarily
22 with considering winter construction with only some
23 summer activity, principally staging and stockpiling
24 of gravel.

25 More recently, two other
26 routes located in the South Yukon have been mentioned
27 as alternatives. The Fort Yukon and the Fairbanks
28 routes have not been studied except for limited areas
29 where work has been carried out by the Fisheries & Marine
30 Service, Northern British Columbia and Yukon Division,

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utilizing regular funds and in connection with other problems and/or for resource assessment purposes.

Q What were the objectives of these field studies carried out?

A The field studies commenced by the Fisheries Service, Pacific Region, commenced in mid-July, 1971. At the onset of the 1972 field season, L.W. Steigenberger joined the technical staff of the study group. Field studies were conducted through April, '74, and the project funding was terminated on March 31, 1975. Thus since March this year the government has not maintained an active research project in pipeline routes.

The Fisheries Service program objective as initially outlined in July, 1971, was:

"to protect the productivity level of the ecosystem as measured in 1971 and 1972 in areas as it may be affected by the construction and operation of gas and/or oil pipelines."

Work plans were carried out to provide preliminary information on the following sub-objectives:

1. To inventory the indigenous and migratory fish stocks, qualitatively and quantitatively;
2. To measure some characteristics of the aquatic environment relative to the fishery resources;
3. To identify factors in connection with pipeline construction or operation which may bring about environmental change detrimental to the fishery resources;
4. To recommend measures that will prevent degradation of the environment during construction and operation of

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1 the pipeline.

2 In pursuit of fulfilling
3 these objectives, six reports have been published and
4 are listed in Appendix 1 to our statements. Two addi-
5 tional reports are complete but as yet remain unpublish-
6 ed. These are identified in Appendix 2. The list of
7 reports does not include manuscripts or memorandum, the
8 data of which have been included in reports published
9 or awaiting publication.

10 Q What general conclusions
11 have you been able to reach regarding route selection?

12 A Well, there's no useful
13 purpose served in repeating much of the specific infor-
14 mation on fisheries resources in the Yukon already
15 provided this Inquiry. I would like, however, to
16 compare the Arctic Gas prime route, interior route,
17 Fort Yukon route, and Fairbanks route through the
18 Yukon Territory with respect to the impact on the fish
19 resources. I remind you that our knowledge of the
20 fisheries resources of the prime and interior routes
21 exist as a result of intensive studies carried out with
22 special funds provided for that purpose and guided
23 through the Environmental Social Committee; whereas
24 knowledge of the South Yukon routes is available only
25 from regular programs related to resource assessment
26 and management and financed by Fisheries & Marine
27 Services funds. The latter studies have covered only
28 parts of each South Yukon route. Further, the alignments
29 for the South Yukon routes are only approximate hence
30 it is impossible to be too exact on some factors, such

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1 as stream crossings.

2 I might add that the Fisheries
3 Service has had some experience with monitoring a
4 pipeline and this was in connection with the Haines-
5 Fairbanks line which existed for several years.

6 In looking at the four routes
7 in question a number of important factors stand out.
8 These include the issues of access by permanent road,
9 availability of water, stock composition and use of the
10 fish resource. We recognize that there may be other
11 factors, but from my point of view these are some
12 of the important factors.

13 Road access has a significant
14 bearing on the route assessment because access increases
15 exploitation opportunity. However, this issue has
16 been discussed at some length by many witnesses and I
17 do not propose to comment further, except to note that
18 from a protection of fish resource point of view, access
19 is important to ensure pipeline maintenance and repair.
20 In the event that an oil pipeline were to follow the
21 gas pipeline alignment, quick and reliable access in all
22 seasons is essential for containment and cleanup opera-
23 tions following a spill. Because the Fairbanks route
24 has a road for more than three-quarters of its length
25 in the Yukon, it has a distinct advantage over the
26 other routes.

27 With respect to the issue of
28 water availability, it is important to remember that
29 opportunities for overwintering of stocks of fish
30 are probably most critical on the prime route where
overwintering survival is dependent upon sections of

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1 unfrozen water in a number of independent systems.
2 The extent of water used on the North Slope is therefore
3 of concern. On the other routes, the overwintering
4 stage may be less critical in that large rivers are
5 available at some point and on the Fairbanks route,
6 lakes as well as large streams serve the overwintering
7 fish populations. Thus in terms of water for overwinter-
8 ing, the prime route is most critical and the Fairbanks
9 route least critical, in my opinion.

10 Stock composition is important
11 to examine because it may have a strong bearing on
12 rehabilitation opportunities in the event of damage.
13 Stock composition is important in two ways, species
14 and racial composition.

15 As for species, there are
16 approximately 50% fewer species in streams on the North
17 Slope than in waters on the other three routes. This is
18 important in that the fewer the number of species, the
19 greater the interdependence amongst species. The loss
20 of one species in a North Slope stream may disrupt
21 the ecosystem to a greater degree than in areas where
22 many species exist.

23 In terms of racial composition,
24 that is number of sub-populations within a species,
25 the North Slope probably represents the simplest structure
26 in that drainage to the sea is by a number of small
27 independent streams or systems each with its own race.
28 The racial structure of stocks along the interior route
29 is theoretically more diverse in that the Porcupine
30 River serves as a focal point and the fish utilize the

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1
2 various waterways, all of which are tributary to the
3 Porcupine. Again, stock diversity probably increases
4 with the Fort Yukon route in that the key streams are
5 the Yukon River, Stewart River and Pelly River, all of
6 which have their own tributary systems and fish stocks.
7 Diversity of composition would appear to be greatest
8 on the Fairbanks route where populations inhabit
9 several lakes as well as streams. The course of
10 rehabilitation following damage is impossible to pre-
11 dict ; however, on theoretical grounds the greater
12 the number of species and the greater the number of
13 species sub-populations in a system, the greater the
14 opportunity for recovery. Hence the opportunity for
15 rehabilitation must be classified as highest on the
16 Fairbanks route and decreases as one proceeds north
17 and is least in area of the prime route in the Northern
18 Yukon.

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Personal use of fish

resources is also an important element in route assessment. Use of fish resources is highest on the Porcupine River at or close to Old Crow where 8,000 to 20,000 fish (salmon, whitefish, grayling, suckers, and burbot) are taken annually. The second highest use of resources for subsistence occurs on the Fort Yukon Route where an estimated 5,000 to 10,000 salmon and a few number of lake trout and whitefish are caught annually. On the Fairbanks Route 2,000 to 4,000 salmon, lake trout, and whitefish are caught for personal use. Along the coastal route personal use is estimated at 1,000 to 3,000 fish annually (Arctic char, whitefish and ciscos).

Commercial use of the fish resources must also be considered. Commercial exploitation is most important on the Yukon River in the vicinity of Dawson City where 10,000 to 20,000 salmon are caught annually. Small fisheries occur in Kluane, Kusawa, Lebarge, Little Atlin, and Teslin Lakes on or close to the Fairbanks Route. Total catch is estimated at 2,000 to 5,000 lake trout and whitefish annually. There is no commercial fishery on either of the two north Yukon routes.

In terms of fish caught for subsistence and commercial purposes, the Fort Yukon Route has the largest catch, then the Interior, Fairbanks and finally the Prime Route. However, in terms of availability of food, the coastal catch is most critical in that other sources of ^{food} supply are not readily obtainable at all times. The catch made at Old

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1 Crow is also critical and essential to the people in that
4 area. In the south Yukon, the availability
6 of other food probably makes the domestic catch less
8 essential than that taken in the north and the fisheries
10 established there are not large scale.

12 In summary, there appears to
14 be, from a protection of fisheries point of view, several
16 advantages for a pipeline on the Fairbanks Route
18 rather than on the Prime Route. These include the
20 greater opportunity for rapid maintenance and repair
22 because of the existence of permanent roads, the
24 greater availability of water, the greater opportunity
26 for overwintering of fishes, the greater diverse stock
28 composition and hence greater opportunity for re-
30 habilitation and, finally, the availability of food
generally through other(that is, commercial) sources,
thus reducing dependence on the fish resource to
meet human needs.

THE COMMISSIONER: Excuse
me, Mr. Walker. You said there at page 8 that from
the point of view of protection of fisheries, you
prefer the Fairbanks Route to the Prime Route. If
you had to choose between the Prime Route and the
Interior Route, what choice would you make on the
basis of those same considerations?

A Mr. Commissioner, I would
select the Prime Route over the Interior Route .

Q You would select it
for the pipeline.

A For the pipeline, yes.

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Q I think that Dr. McCart who gave evidence here earlier took the same view and one thing that he relied upon, it seemed to be the most important thing to him, maybe I misunderstood him, but he said that there are a larger number of species on the Interior Route and I thought that he meant that the pipeline, assuming that it would cause damage, would cause less damage because of the limited number of species on the coastal route than it would on the Interior Route. Does that make sense to you, or do you think that I have not comprehended his position adequately?

A Well, in my consideration of the Prime Route over the Interior Route for a pipeline, there were two factors. One is that it is true that there are more species on the Interior Route, up to 17 on the Porcupine River, for example, as compared to six freshwater species on the Prime Route; but also the catch, the personal use catch is much greater on the Interior, or alternative, for example, that is 8,000 to 20,000 in the vicinity of Old Crow, whereas it is 1,000 to 3,000 on the Prime Route and I think that this is an important factor.

Q Those are the two main considerations that you had in mind.

A Yes. Well, also the availability of water is probably greater on the Interior Route than the Prime Route in that you have the Porcupine River. Therefore, there is the greater opportunity for overwintering of fishes. There is also

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greater -- well, we have mentioned the number of
species -- a greater diversity in stock composition,
because of tributary streams -- it is a complex
system with a main branch and several tributary
streams and you would have, not only a greater number
of species, but also possibly a greater number of
sub-populations or races within a given species.
So you have, theoretically, a greater opportunity
for rehabilitation.

MR. MARSHALL: Mr. Commissioner,
I think Dr. McCart's principal concern with respect
to the Interior Route is a concern for the Canning
River valley.

THE COMMISSIONER: Yes, no
doubt he said that. I don't have my notes before
me. I just wanted to compare what he said about
a number of species with Mr. Walker's view. You are
ready to turn to Mr. Steigenberger. I wonder if we
could stop for about five minutes and then carry on.
This isn't our official halfway -- halftime, but we
will just stop for about five minutes or so.

(PROCEEDINGS ADJOURNED FOR FIVE MINUTES)

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(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

MR. ANTHONY: Mr. Steigenberger, we can turn to you. Would you describe the findings of the Fisheries surveys that preceded your work in the Northern Yukon.

WITNESS STEIGENBERGER: The studies conducted by the Fisheries & Marine Service for the Environmental Social Committee were along the two proposed pipeline routes within the Northern Yukon Territory. The initial report by Bryan and others provided us with the baseline information on distribution of periphyton, macro-invertebrates, and fish. Some detrimental effects of pipelines to aquatic resources were also outlined. Consideration was also given to gravel removal and the use of toxic chemicals as it relates to fish. Within the Yukon Territory, the report stated that pipelines should not be allowed to cross portions of spawning areas in the Firth River on the prime route, the Fishing Branch River on the interior route, and any other major spawning ground in general, and concluded that based on the first summer's research, the coastal route seemed preferable from a standpoint of potential damage to fishery resources in the Northern Yukon Territory.

Supplementary study of the importance of the Fishing Branch River near the headwaters of the Porcupine River for chum salmon populations was carried out by Elson. He found that the Fishing Branch River supported a spawning population of 350,000 chum salmon during 1975.

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The second report by Bryan provided additional baseline parameters and aspects of research conducted in 1971 and 1972. Summer and winter surveys in the Northern Yukon and monitoring a stream crossing during winter pipeline construction in the Southern Yukon were completed for the report. The reported noted that the concentration of suspended sediment observed during excavation of a pipeline trench in the LaBiche River ranged from 74 to 543 parts per million above background levels, and went on to recommend that additional studies of pipeline crossings be carried out to determine whether the observed levels are typical. Moreover, appropriate bio-assay experiments are needed to establish whether the observed concentrations would be detrimental. These experiments would require representative northern species acclimatized to conditions during the season of proposed pipe construction and exposed to suspended sediment together with other possible synergistic components of the water. In addition, the affects of sediment on fish eggs and invertebrates need to be investigated.

I support these recommendations if pursued and feel that they would provide invaluable information for the maintenance and the protection of the existing indigenous fish stocks.

While I recognize that much research has been completed, I am not entirely satisfied that the questions raised have been answered adequately.

In addition to aspects of a technical nature relative to fish, the author also

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1 dealt with questions of route selection, timing of
2 construction and safeguards. The implications for
3 route selection and timing of construction and abandon-
4 ment can be summarized as follows:

5 (1) Implications for route selection.

6 "Spawning grounds and overwintering areas are
7 probably the fish habitats which would be the
8 most sensitive to effects of a pipeline. Sedi-
9 ment during or after construction would render
10 them unsuitable for spawning. Therefore, a
11 primary consideration in recommending pipeline
12 routes is the desirability of crossing rivers
13 downstream of spawning grounds. Overwintering
14 areas might also be adversely affected by a
15 pipeline, and because they are so important to
16 adult and juvenile fish, should be avoided."

17 (2) Implications for timing of construction and abandon-
18 ment.

19 "The timing of construction or abandonment
20 of stream and river crossings is important because
21 fish populations would be affected differently at
22 different seasons. Where spawning grounds occur
23 downstream of a construction site, it is important
24 not to perform construction while the eggs are
25 incubating. Until tolerance limits are established,
26 it is important to avoid construction when major
27 overwintering fish populations would be affected.
28 Construction and abandonment operations should also
29 be scheduled to avoid interrupting fish migrations,
30 particularly spawning migrations. If construction

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1 is allowed to proceed during periods of fish
2 migrations, then it would be necessary to
3 monitor the passage of fish and to halt the const-
4 ruction if migration is impeded. After pipeline
5 proposals have been submitted, construction
6 schedules can be developed which are appropriate
7 for each crossing."

8 A partial list of safeguards
9 necessary to protect the fisheries resource has been
10 extracted from the Bryan Report and included in Appendix
11 3. In general, I support these recommendations as
12 being in the best interests of the fisheries resource
13 and habitat. I would add that this is only a partial
14 list and that the recommendations may not necessarily
15 be consistent with other published recommendations.
16 However, I would hope that this Inquiry would recommend
17 that serious consideration be given to all published
18 recommendations prior to preparation of final design.

19 The evaluation of these con-
20 flicting recommendations should be done on site speci-
21 fic basis prior to final design.

22 Q Mr. Commissioner, Mr.
23 Steigenberger is referring to three reports, the
24 first one, the Bryan Report, ESP-73-21, is Exhibit
25 381 in this Inquiry. The second one, the supplementary
26 study by Elson, is not an exhibit and I'm tabling it
27 as the next exhibit number; and the third one, the
28 second Bryan Report, ESP-73-6, is Exhibit No. 382 in
29 this Inquiry.

30 Mr. Steigenberger, would you

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1
2 describe the fisheries research in the context of
3 impact within a corridor?

4 A The Government of Canada
5 released in 1972 the expanded guidelines for northern
6 pipelines. In principle, the guidelines emphasize
7 the corridor concept in the development of the north.
8 From a fisheries point of view, it is impossible to
9 relate to the corridor concept. A watershed concept
10 must be stressed to indicate the possibility of
11 environmental disruptions which, although occurring in
12 locations within the corridor, may have widespread
13 primary and secondary effects over a wide range of
14 ecological niches occupied by various life history
15 stages of fish species. This would be particularly true
16 for documented spawning and overwintering areas above
17 (therefore considering migrations), and below (there-
18 fore considering increased sedimentation from construc-
19 tion and/or gravel removal) proposed crossing sites.
20 If the corridor concept was strictly applied, monitoring
21 and enforcement of all phases of construction,
22 maintenance and abandonment would be limited to a narrow
23 corridor. In evaluating the corridor concept, there-
24 fore, it is recommended that the following points be
25 answered:

26 (1) What are the appropriate boundaries of the corridor
27 so that further studies, monitoring and enforcement
28 can be conducted over an ecological area and not be
29 restricted by artificially set boundaries?

30 (2) Is total utilization of natural resources within the

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corridor to be practiced, or should specific sites (such as critical areas) or certain quantities of materials within the corridor be protected against use?

(3) Do the boundaries of the corridor limit all activities to the defined space, or can corridor boundaries be crossed for special and/or specified uses such as water use, stream, gravel and haul roads?

Q In your view, what are the critical areas in the Northern Yukon?

A In the extreme climatic conditions of the Northern Yukon, winter is a critical time for all fish species. Waters of an environmental quality (therefore open water areas) capable of supporting one or more stages of life cycle are extremely limited. For this reason areas of known or documented fish utilization, and indeed those of known acceptable water quality (therefore having some potential) should be recognized as of particular importance and protected as such.

Areas of heavy fish concentration at any time of the year should also receive special consideration. These may be sites of high productivity (such as estuaries) which attract and support all life stages, or they may be areas utilized for certain life functions such as spawning, and they can be either in the spring or fall.

Both industry and government are aware of the documented and potential overwintering and/or spawning areas within the Northern Yukon. Further collection of data will bring other areas into focus,

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and to qualify and quantify potential (therefore
probable or suspected overwintering and spawning areas).

The papers referencing these areas include:

Chapters II and III of Volume 15 of the
Biological Report series.

Environmental Social Committee Reports No. 73-6
and 74-20.

Volume I, Biological Engineering Evaluation
which are technical reports of Fisheries Service,
Vancouver.

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Q Mr. Commissioner, again the ESP Reports have already been tabled as exhibits. The volume number 3 which is volume 1 -- referred to there as volume 1 has not been tabled and will be given the next exhibit number, and the last item, the Biological/Engineering Evaluation is already an exhibit, exhibit number 310.

A These reports all include reference maps of critical areas. It is important to remember that these designations were based on assumptions that there would be a gas pipeline alone and it would be constructed only during the winter months. Then I would like to add, undoubtedly additional areas would come to light in view of construction of an oil pipeline or if summer construction is advocated or necessary.

Q What in your opinion are the critical areas along the Prime Route and what recommendations would you make?

A Surveys have indicated that those stream sections directly affected by a pipeline corridor are utilized by fish only in the summer months, therefore, breakup to freezeup, with the possible exception of large rivers such as the Firth River and Babbage River. Therefore, it is felt that attention must be directed towards other areas such as groundwater-fed stream sections and the estuaries and lower limits of coastal streams.

Open water and stream channels in the vicinity of aufeis areas have been shown to support spawning, rearing and overwintering of Arctic char.

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Arctic grayling also tend to concentrate in groundwater areas. The documented open-water and aufeis areas where fish utilization has been confirmed are:

1. Fish Creek headwaters;
2. Aufeis area and stream west of the Firth River, and delta;
3. Joe Creek headwaters;
4. The Firth River headwaters;
5. The Babbage River, above the falls, which has an isolated char population;
6. The Babbage River, below the falls.

In addition, a number of open stream sections, therefore potential areas, were observed in March 1972 and more aufeis areas were noted during a summer survey in July 1973. One of these areas tested, Fish Creek, is slated for major construction activity including wharf site, stockpile site, water utilization, gravel removal and haul roads.

The additional areas are:

1. Craig Creek, aufeis area upstream of proposed crossing;
2. Fish Creek, upstream of the mouth;
3. The Malcolm River headwaters;
4. The Spring River, aufeis area upstream of the proposed crossing;
5. The Crow River, aufeis area downstream of the proposed crossing.

I would like to point out that both Craig and Fish Creeks have high oxygen

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1 readings capable of supporting overwintering fish
2 populations. McCart, in 1973, examined both the
3 the readings were low,
4 Spring and Crow Rivers groundwater flows. Although /
5 they still appear to be sufficiently high to support
6 some Arctic fish species for overwintering.

7 It is presumed that the
8 higher temperature of the groundwater source, for
9 example, the Crow River at 2.0°C, keeps the
10 area ice-free for some distance below the upwelling.
11 Low water surface temperature and its reciprocal high
12 oxygen solubility should permit rapid aeration at the
13 air-water interface, thus increasing the overwintering
14 potential of the areas. Further investigation is, how-
15 ever, necessary.

16 During the March 1974 winter
17 survey of the North Slope rivers, no new critical areas
18 inhabited by fish were discovered. However, one
19 additional open-water area downstream of a proposed pipe-
20 line crossing was noted. The site is located on the
21 Malcolm River downstream of the proposed crossing. The
22 exact source and discharge of the water is unknown.
23 The possibility of sub-gravel water flows at the proposed
24 crossing and the potential of this area providing addi-
25 tional overwintering habitat downstream should be
26 investigated. This area is also slated as a borrow
27 site and water supply and possible conflicts may
28 arise during construction.

29 Earlier it was postulated that
large watercourses such as the Firth and Babbage Rivers
might contain isolated and/or discontinuous pockets of

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water that may be of acceptable water quality to afford an overwintering habitat for fish and invertebrates. The mainstem of the Firth River appeared to be frozen to the bottom at the crossing site. However, massive overflow ice, usually indicating winter flow, was evident downstream of the proposed crossing. Should the presence of water beneath the overflow ice be confirmed, it may provide additional overwintering areas for fish. The overwintering environment is probably made possible by the discharge of the groundwater source west of the Firth River and delta and the possibility of as yet an undetected subgravel flow along the mainstem of the Firth River. Craig and McCart, in 1974 indicated the large downstream aufeis area as a probably overwintering area. They also identified one further upstream near the junction of Joe and Muskeg Creek. Thus, it appears that the Firth River downstream of the proposed crossing has excellent potential to overwinter fish populations.

In the Babbage River, one pocket of water approximately 1/4 mile upstream of the crossing site was sampled. Based on the oxygen measurement and temperature, the possibility of overwintering habitat in the mainstem of the Babbage River exists. Sampling in this area and in similar areas for the presence of fish and food organisms and the sources of water remains an essential requirement of future study prior to construction.

The investigation by McCart and others, the Environmental-Social Program and the

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1 Beaufort Sea Project indicate that estuaries and the
2 stream sections near river mouths support numerous,
3 diversified summer fish populations. Large numbers of
4 least cisco and Arctic cisco and frequently broad
5 whitefish, humpback whitefish, inconnu, sculpins, flat-
6 fish and the usual Arctic char and grayling have been
7 observed throughout the summer months. Indeed, the outer
8 spits of some estuaries and lagoons are fished for the
9 abundant populations of whitefish and Arctic char by
10 local natives until ice formation.

11 Most of the major estuaries have
12 been studied in summer. However, other estuarine environ-
13 ments should be surveyed, especially in the winter months,
14 to ascertain their potential carrying capacity for
15 overwintering fish.

16 Q What were the findings of
17 the winter surveys that you've conducted?

18 A The winter survey of
19 the Biological/Engineering Evaluation revealed that the
20 overwintering areas for freshwater species, in addition
21 to the ground water sources, along the north coast
22 -- along the coast of the North Slope of the Yukon is
23 probably limited to that area of the Beaufort Sea under
24 the influence of the discharge of the Mackenzie River.
25 Support data is in the form of salinity measurements
26 collected at various locations. Arctic cisco and least
27 cisco were caught approximately five miles north of
28 Shingle Point during March to April 1974 and the in-
29 connu were caught in the vicinity of Sabine Point
30 during April 1973. In addition, a marine fish species

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was caught in Thetis Bay near Herschel Island and marine invertebrates were observed north of Sokes Point.

The data may be summarized as follows:

1. In addition to the documented overwintering areas for Arctic char and grayling within the rivers of the northern Yukon, the only freshwater fish species, (inconnu, least cisco and Arctic cisco) evident during the winter were caught north and east of Sabine Point. Based on salinity measurements, the data is a freshwater environment influenced by the discharge of the Mackenzie River.
2. The line of division between freshwater and marine environment is somewhere between King Point and Sabine Point, however this probably depends on the discharge of the Mackenzie River. Moreover, the line of division also appeared to be coincidental to two parallel pressure ridges of pack ice running north east of King and Sabine Points.
3. The data illustrates that the Spring River estuary and Phillips Bay including the lower limits of the Babbage River and Deep Creek, based on replicate salinity samples, had a higher salinity measurement than observed in deeper offshore waters. The estuary and shallow water areas appear to act as areas of salt concentration and thus are poor overwintering habitat. In addition, even areas such as an estuary lake near Shoalwater Bay which lies adjacent to the Mackenzie Delta and documented as a rearing area for inconnu during the summer, need not provide a suitable overwintering habitat for freshwater fish during the

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1 winter.

2 Our conclusions are that the
3 estuaries and the Beaufort Sea Coast area highly produc-
4 tive areas and are critical areas in the summer months.
5 I would recommend, therefore, that further study
6 be undertaken to determine the population size, com-
7 position and movement of fish along the Beaufort Sea-
8 Mackenzie Delta area. Such studies should concentrate
9 in particular on the placing and construction of wharves ,
10 etc., so as to protect the fish resource, the implemen-
11 tation of special precautions and clean-up techniques
12 against toxic spills into the coastal waters and the
13 protection of the domestic fishery at Shingle Point
14 and Komakuk Beach, both areas designated as supply
15 and stockpile sites.

16 Q What, in your opinion,
17 are the critical areas along the Interior Route and
18 what recommendations would you make?

19 A The carrying capacity
20 of the Porcupine River and its several tributaries
21 is undoubtedly limited to overwintering areas
22 within the system capable of furnishing sufficient
23 dissolved oxygen to maintain fish populations. The
24 preservation of such areas is important together with
25 the preservation of pathways affording ingress to and
26 egress from the areas. The migration pathways are
27 utilized principally in the fall and spring months.

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1 The lower limits of the Old
2 Crow River have been documented as one major pathway
3 to overwintering areas in the Porcupine River. By late
4 December or early January it is expected that
5 overwintering sites have been established and contain
6 large concentrations of fish. Most reaches of the
7 tributaries of the Porcupine River are unsuitable
8 habitat for overwintering by late winter. The exceptions
9 being groundwater sources and possibly the Bell River.

10 Several small tributaries were
11 evidently devoid of life. Potato Creek, Surprise
12 Creek, Schaeffer Creek, Driftwood River, Rat Indian
13 Creek, Berry Creek, Waters River and the upper Rat
14 River were frozen to the bottom at the proposed pipeline
15 crossing sites. Water at the mouth of Schaeffer Creek
16 had a low oxygen value of .2 milligrams per litre,
17 and Berry Creek, a tributary to the Porcupine River,
18 contained isolated pools of water with .4 milligrams
19 of oxygen. All of these rivers are probably uninhabit-
20 able in late winter.

21 Areas which have been identi-
22 fied as important for overwintering include groundwater
23 fed streams, the main stream of large rivers, and
24 several smaller streams with adequate winter discharge.
25 Again, open water areas are critical. Three of these
26 groundwater sources, documented as major overwintering
27 areas, are:

- 28 (a) the Old Crow River headwaters, supporting approxi-
29 mately 20,000 grayling and other species during 1973;
30 (b) the open water area of the Fishing Branch River,

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1 supporting the incubating eggs of chum, chinook, coho
2 salmon as well as populations of Arctic grayling, round
3 whitefish and sculpins. I'd like to add to (b) that in
4 1957 we had 350,000 chum salmon and sculpins
5 (c) the Miner River, which is a chinook salmon spawning
6 has been documented in that river.

7 Other areas associated with
8 groundwater sources that may offer potential overwinter-
9 ing sites are:

- 10 (a) the Bell River and Little Bell River headwaters
11 (b) the Salmon Fork River headwaters
12 (c) the Bluefish River, and possibly
13 (d) the Waters River.

14 The Bluefish River exhibits
15 some unusual relocation of open water areas from winter
16 to winter. The reason for this is not understood, but
17 the shifting locations may influence the suitability
18 of this river as an overwintering habitat. Historical
19 data indicates that grayling populations overwinter in
20 the river and sculpins have been observed during the
21 winter.

22 Studies in October, 1972 and 1973,
23 and April, 1973, indicate that documented overwintering
24 sites in the mainstem Porcupine River, and potential
25 sites on the Bell River, and the stream mouths associated
26 with these rivers. The Bell River is observed to have
27 winter oxygen values of between four to six parts per
28 million, or milligrams per litre at and below the
29 proposed crossing site, sufficient to sustain overwinter-
30 ing fish. The Porcupine River supports overwintering

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1 populations of white fish, Arctic grayling, pike, burbot,
2 suckers, lake chub, trout, perch and sculpins.

3 The Driftwood River appeared to
4 have some potential to support overwintering fish popula-
5 tions. Upstream of the proposed pipeline crossing
6 site an open water area was observed. Downstream of
7 the crossing site four overflow areas originating on
8 the bank of the river were noted.

9 An open water and potential
10 overwintering area on the upper Rat River was also
11 observed and sampled. The location was downstream of
12 the proposed headwater crossing and displayed a dissolved
13 oxygen level of 8.8 milligrams per litre, sufficient
14 to sustain overwintering fish.

15 Also noted were overflow water
16 areas arising from the slope of the plateau proposed
17 as the pipeline right-of-way on the north side of the
18 Rat River. The overflow sources of water from these
19 three sources were associated with small tributaries of
20 the Rat River.

21 To date, any conclusions of the
22 habitability of the Bell River during the winter can
23 only be very preliminary. During the summer survey,
24 large inconnu, in near-spawning condition were caught
25 in the area of the crossing site. Post-spawning down-
26 stream movements of inconnu in the Selawick and Kobuk Rivers
27 in Alaska were also found. It is tentatively proposed
28 that inconnu spawn in the area and after spawning
29 undergo a downstream migration. Historical data suggest
30 a downstream migration of Arctic grayling from the

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1 Rat River which is a tributary to the Bell River in the
2 fall.

3 Detailed examination of the
4 open water areas in the headwaters of the Bell and the
5 Little Bell Rivers has not been completed. There is an
6 indication that the Bell River is probably uninhabited
7 as far down as the Eagle River. In all likelihood,
8 the Bell River downstream of the Eagle contains water
9 depths and habitat suitable for overwintering fish
10 populations.

11 It should be stressed that the
12 identified critical areas, identified above, have been
13 designated as either documented or potential overwinter-
14 ing and/or spawning areas by various researchers. The
15 terms "suspected" and "probable" have also been applied
16 to spawning areas by both industry and government
17 biologists. Refinements of a quantitative nature on
18 documented areas and additional studies on potential
19 and/or probable or suspected areas is probably warranted.

20 It should also be pointed out
21 that my data varies in some respects with that reported
22 by McCart in 1973. In 1974 when I did my winter study
23 an increase in ice thickness (roughly double) was obser-
24 ved and correspondingly water levels decreased or were
25 non-existent in rivers where previously (therefore in
26 1973) exhibited a water quality able to support a
27 winter habitat for fish. Due to the variation in limits
28 of aquatic winter habitats, care should be exercised in
29 outlining stipulations and regulations for timing and
30 methods of construction at proposed crossing sites.

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1 The extent of ice formation resulting from climatic
2 conditions must therefore be considered in outlining
3 critical areas and subsequently issuing recommendations.
4 This would apply in particular to water utilization
5 from groundwater sources.

6 Probable spawning areas for
7 grayling that are close to the proposed crossing sites
8 on the prime route are found in the Firth River, the
9 Crow River, the Trail River, Deep Creek, the Walking
10 River, the Blow River, and Rapid Creek. Probable spawn-
11 ing areas for grayling and other species close to the
12 proposed crossing sites on the interior route are found
13 on Potato Creek, Surprise Creek, the Old Crow River, the
14 Driftwood River, Beery Creek, and the Rat River (in the
15 headwaters crossing).

16 My recommendation is that all
17 documented and potential overwintering and/or spawning
18 areas in close proximity to the proposed crossing sites
19 capable of supporting one or more life stages of
20 fisheries resource and probable spawning sites be
21 designated as of particular importance (therefore
22 critical) and protected as such.

23 Q What conclusions have you
24 reached regarding the appropriate route selection for
25 the Northern Yukon?

26 A From the information avail-
27 able at the present time, I concluded that from a fisher-
28 ies resource point of view the proposed northern coastal
29 route, therefore the prime route, is the preferred
30 alternative rather than the interior route. The decision

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1 for the northern route is based on several biological
2 considerations including the extent of domestic and
3 recreational use, the location and uniqueness of the
4 overwintering areas, and the behaviour of fish popula-
5 tions on both routes. A summary of important points of
6 these considerations follows:

7 (1) The rivers on the North Slope are essentially unit
8 identities with a smaller drainage area downstream of
9 the crossing site than above. In the event of environmen-
10 tal disruptions through construction, operation and
11 abandonment of a pipeline, the effects can more likely
12 be confined to a single watershed in contrast to poten-
13 tially more widespread effects in the interconnected
14 Porcupine River drainage.

15 (2) Subsistence requirements dependent on the North
16 Slope fisheries are less than on the southern route.
17 Environmental disruptions adversely affecting the
18 fisheries resource and the residents' livelihood would
19 have more serious immediate consequences on the southern
20 or interior route.

21 (3) Traditional fishing sites on the northern/^{or prime}route are
22 not
23 /closely related to the pipeline crossing sites and
24 potentially affected areas. However, fishing sites on
25 the southern or interior route near Old Crow tend to
26 be downstream of, or nearer to the crossing sites and
27 thus more susceptible to damage in the event of dis-
28 ruptions. Additional information is available in Volume
29 I of the technical reports which was tabled.

30 (4) On the northern route most overwintering areas or
groundwater sources are upstream of the pipeline crossing

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1 sites. It is believed that larger numbers of fish
2 overwinter downstream of the pipeline crossing sites
3 on the southern or interior route. In the event of an
4 environmental disruption, the overwintering areas on
5 the northern or prime route would be safer.

6 Q What concerns do you have
7 concerning the potential for toxic spills?

8 A Some fluids utilized in
9 construction areas such as engine oils -- engine fuels
10 and oil, anti-freeze and stove oil, may be toxic to
11 fish and therefore should be kept out of water bodies.
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Fluid losses occur by accidents in storage, transport and transfer, by careless refuelling practises, by dumping unused portions and by washing out containers preparatory to removal. I would recommend the following:

1. that storage facilities for refined petroleum products and potential toxicants be surrounded by impervious dykes.
2. that hoses, nozzles and all dispensing equipment be continually inspected for leaks and spills;
3. that storage and transport of refined petro products in the field be done no closer than 1/4 mile of a stream;
4. that no products be disposed of outside of a designated area;
5. that no containers be washed in streams or lakes.

Q What concerns do you have with respect to an oil pipeline?

A At this time there appears to be no definite plan for an oil pipeline, however, it must be considered as a high possibility in the long term. An oil pipeline will require a greater amount of gravel than a gas pipeline, will undoubtedly require permanent roads ^{out} through its length and the effects of a broken line on the aquatic resources will be greater with oil than gas.

Some components of crude oil are toxic to fish. Also, the oil in covering the water surface reduces and/or excludes light and oxygenation thereby adversely affecting production of the invertebrates which serve as food to fishes.

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From a fish resource point of view, a broken oil line may represent the most difficult problem to resolve. A wide range in annual temperatures in varied topography and ground conditions presents complications perhaps not yet identified. Winter and summer work plans are, therefore, required for oil spill impoundment and cleanup techniques. The potential for damage to the fish resource decreases as the opportunity for impoundment increases prior to the oil reaching biologically critical areas and/or economically or socially important areas. Further research on the potential impact of an oil pipeline is critically needed.

Q What recommendations would you make with respect to gravel removal ?

A The application of a corridor concept with regard to gravel removal in relation to the fisheries resource of the proposed pipeline crossing sites should be implemented to test if it applies in reality. If applied, all phases of construction maintenance and abandonment would be limited to a narrow corridor ensuring a natural wilderness reserve outside the corridor.

No study was made by the Fisheries Service on the interrelationships and dependence of the fisheries resource on the gravel resource. Gravel is a necessary prerequisite in the life cycle of fish, and aquatic and benthic organisms. Since extensive use of gravel is anticipated during construction of a pipeline, conflicts may arise. Each proposed borrow area should be considered in the light of available data

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on turbidity naturally present, incremental effect of additional silt and the timing of the increments in terms of spawning, rearing, overwintering and perhaps migration. Consideration should also be given to future recruitment of displaced gravel.

In addition to gravel removal, some concerns are channelization, diversion of flow and construction of coffer dams which may alter the discharge patterns, the levels of silt introduction and the rate of bed load movement. These events spatially destroy the pool-riffle relationship and thus decrease the overall productivity of the stream. To protect the fisheries resource, the following recommendations are submitted relative to gravel removal.

1. No gravel removal should be allowed from areas designated as critical, therefore either documented or potential, from domestic fishing sites or areas of recreational use.

2. No gravel removal below the high water mark of a stream during times of utilization -- I think this second statement -- No gravel removal below the high water mark of a stream during times of utilization by fish and food organisms. I might add here that this second statement is in the best interests of the fisheries resource and the high water mark that I referred to is the maximum high for the river.

THE COMMISSIONER: The maximum annual high?

A Yes. I will continue now.

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3. Go on in three, and you say: if gravel removal from below the high water mark and above the wetted perimeter of the stream is deemed necessary, the following should apply:

- i. No gravel removal until the pipeline route and the dimension of the corridor have been designated.
- ii. Gravel removal restricted within the bounds of the corridor;
- iii. Inventory of the quantity of stream gravel below the high water mark and within the boundaries of the corridor for each crossing site.
- iv. For each crossing site establish a "safe" quantity of gravel for the continued maintenance of the fisheries resource on a long-term basis.
- v. Establish a gravel removal quota for the quantity, location depth and area of gravel removal below the high watermark and above the wetted perimeter for each crossing;
- vi. Assess and submit an impact statement for each crossing site on the effect the gravel removal will have on the watershed.
- vii. All gravel removal should be monitored and once the quota for removal is reached it becomes the responsibility of the constructing agency of the pipeline or ancillary project to develop alternate sources of gravel within the corridor but outside the high water mark of the river. This would prevent over-utilization in the areas of limited supply and prevent the continued long-term

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degradation of the fisheries environment by continued removal for maintenance of pipelines and other ancillary projects requiring additional gravel supplies.

4. If gravel removal from below the wetted perimeter of the stream occurs, the following should apply:

- i. The levels and duration of silt introduction are within the standards of the monitoring agency.
- ii. Gravel removal and the trenching operations should not decrease the number of backwaters and disrupt the pool-riffle interrelationships.

More often than not, small backwaters have warmer temperatures and higher primary productivity for food organisms. Fry and juvenile fish utilize these areas as feeding, rearing, and protective areas. Some species of large fish feed on localized concentrations of small fish. The backwaters provide staging and resting areas during fish migrations. Thus, it may be beneficial in some cases to construct backwaters in gravel removal areas that are in close proximity to the stream. These would provide additional protective, rearing, feeding and resting areas for the natural enhancement of the fisheries resource.

Q What concerns do you have regarding water utilization and what are your recommendations?

A The removal of water from streams for domestic or other purposes, related to pipeline activity may pose serious problems to the fish resource.

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Lower volumes could result in parts of the watershed becoming dry, killing the resident fish. Migration could be impeded or prevented and the lower velocity could adversely affect spawning. Decreased water levels could possibly result in a confinement of fish to deeper areas and removal of young from the protection of the shallows. Drying up of the shallows and backwaters would also reduce food production. The very young fish may be drawn through intake screens because of their small size. A decrease in the discharge could have very adverse consequences on the overwintering potential of a body of water as ice formation would be greater.

In view of these points, several recommendations can be made on the subject of utilization. These points are only directed towards temporary utilization by construction camps of limited size and do not consider the disposal of effluents and domestic sewage.

1. No water ^{removal} should be allowed from areas denoted as critical areas.
2. It will be necessary to predetermine the discharge in rivers and volumes in lakes to prevent over-utilization of the water body.
3. Overwintering sites under ice are limited in volume. Removal should be prevented when possible or allowed at a rate in proportion to discharge that will not damage the populations present.
4. Appropriate measures should be taken to prevent the entry of fish into the intake such as utilizing

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1 screens over the intake, placing intake inside of
2 porous berms or fixing intake in a buried container.

3 In view of these points, it is
4 felt that some of the best sources for water are large
5 lakes, where the volume removed would be relatively
6 small compared to the total volume available. However,
7 usage should be based on individual investigation of
8 lakes, and on assessments of their utilization and produc-
9 tivity.

10 Q What further recommendations
11 do you wish to make to this Inquiry as a result of
12 your research and study in the Northern Yukon?

13 A The Biological/
14 Engineering Evaluation of the proposed pipeline in
15 the northern Yukon Territory provides general and
16 site specific recommendations.

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1 Having obtained both general
2 and specific information on most of the proposed pipeline
3 crossing sites, it is recommended that consideration
4 be given to implementation of the general recommendations
5 and site specific construction considerations detailed
6 in that report. Consideration of these recommendations
7 may avoid conflicts which would otherwise arise.

8 Q Mr. Commissioner, that
9 report has been tabled and the recommendations are
10 identified in that report.

11 A Generally from an engin-
12 eering point of view, it is recommended that a post-
13 construction monitoring program of river beds in the
14 vicinity of pipeline crossings be implemented on a
15 regular basis to guard against localized degradation of
16 the river channels. In addition, it is hoped that the
17 potential impacts of pipeline construction on river
18 crossings would be evaluated and the appropriate modi-
19 fications, if necessary, built into the final design
20 stages. Unanswered questions or impacts would require
21 further study, further research.

22 From a biological point of
23 view, it is recommended that attempts be made to mini-
24 mize the detrimental effects of all phases of construc-
25 tion on aquatic life forms (therefore fish and inverte-
26 brates) inhabiting the rivers and water bodies crossed
27 by or adjacent to the proposed right-of-way and associa-
28 ted facilities of the pipeline. To date, a large
29 number of reports have been published and each has con-
sidered many aspects of pipeline construction or

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1 disturbances in the life history stages (therefore
2 spawning, migration, overwintering and rearing) of fish
3 that will be affected by pipeline construction. Some
4 additional information on the effects of invertebrates
5 is also available. In all these reports, many detrimen-
6 tal effects have been postulated and many recommendations
7 by government and industrial agencies have been put forth.
8 Hopefully the published recommendations will be heeded
9 and used to formulate stipulations that will be incor-
10 porated into the design prior to construction. It
11 should be emphasized that every effort must be made to
12 schedule construction phases to minimize disturbance
13 to the aquatic resources.

14 Aside from these more general
15 biological-engineering recommendations, some site
16 specific construction recommendations for each of the
17 river crossings on the two proposed routes through
18 the Northern Yukon Territory have been prepared. The
19 specific construction considerations for each proposed
20 crossing site are included in Appendix 4 of this present-
21 ation and I present these as specific recommendations
22 to the Inquiry. Also I refer the Inquiry to Volume
23 I of the Fisheries Service Technical Reports, tabled
24 with this evidence which contains further specific
25 recommendations.

26 Q Mr. Commissioner, as
27 indicated in the evidence here, there are recommendations
28 in both those reports that Mr. Steigenberger puts
29 forward as part of his evidence. In addition, in
30 Appendix 4, for the ease of others, we have withdrawn

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1 the specific recommendations as found in the biological-
2 engineering report on a site specific basis. You can
3 see that it goes from stream crossing to stream crossing
4 along the route, making recommendations that should be
5 considered. Again that also forms part of the recomen-
6 dations that Mr. Steigenberger makes to this Inquiry.

7 A It should be pointed out
8 that both of these reports are based on both biological
9 and engineering considerations. Engineering consider-
10 ations are intended to identify some of the potential
11 impacts relating to construction and operation of the
12 proposed pipeline at the individual crossing sites.
13 Hopefully, this information will provide some basis for
14 offsetting or minimizing some of the potential problems
15 prior to construction. In addition, the information
16 may be beneficial in outlining further study require-
17 ments prior to the final design and construction phases.

18 The lack of definitive informa-
19 tion on each river proposed to be crossed during pipeline
20 development is an obvious and common occurrence in most
21 research reports. More information on scour depths,
22 sediment levels, gravel resources, winter sub-gravel
23 water flows, and seasonal discharge of rivers and
24 groundwater areas would be an asset. In addition, it
25 would be desirable to have some more information on
26 the significance that all the open water areas have on
27 the life history stages of the fishery and invertebrate
28 resources and the influence they have on overwintering,
29 spawning and migration. Moreover, the provision of more
30 water quality measurements would also be an asset.

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It is recommended that additional winter surveys be conducted on a representative number of rivers on the North Slope of the Yukon Territory to provide the information discussed above. These should include rivers which are known to have open water flow or an accumulation of aufeis during the winter period, as well as rivers which are apparently dry and completely frozen. A tentative list of rivers which would be included in the survey is as follows:

- (1) The Firth River as representative of a large river with an aufeis area below the proposed crossing site.
- (2) The Spring River, as representative of a small river with an active aufeis area in the vicinity of the proposed pipeline crossing site.
- (3) Craig Creek as representative of a small river which is apparently dry during the winter at the proposed crossing site, but contains an active aufeis and open water area a short distance upstream.
- (4) The Blow or Walking Rivers as representative rivers which are apparently dry during the winter and contain no aufeis or open water areas.

The surveys should be scheduled to coincide approximately with the timing of construction and should include the following operations:

- (1) Drilling at several points within the flood plain to ^{water} ascertain the presence or absence of sub-gravel/flow and the depth at which it occurs.
- (2) Inspection of open water areas downstream of the proposed crossing site to define overwintering areas

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1 for fish and invertebrates. That would also apply to
2 areas that are upstream.

3 (3) Determination of the source of water for aufeis areas
4 downstream from or in close proximity to the proposed
5 crossing .

6 It is also recommended that
7 in the final design of the pipeline detailed considera-
8 tion should be given to the following. This is a list
9 of considerations specific for the Northern Yukon. I'll
10 just repeat myself again. It is also recommended that
11 the final design consider the following:

12 (1) That slope stabilization on rivers such as the
13 Blow River (deeply incised) and Craig Creek (undergoing
14 lateral migration).

15 (2) An accurate assessment of the scour depth due to
16 ice and peak discharges in North Slope rivers.

17 (3) An accurate assessment of the effects of gravel
18 removal on the aquatic habitat especially in areas of
19 groundwater flows.

20 (4) Road access particularly on the Blow River.

21 (5) The effects of intersecting winter sub-gravel/^{water}flows
22 during trenching.

23 (6) The impact of road construction and staging areas
24 outside the limits of the pipeline right-of-way.

25 I might add that that could
26 be both at Komakuk Beach and Shingle Point.

27 The construction considerations
28 put forth on each of the rivers are not necessarily
29 a complete list because of the deficiencies discussed
30 above. However, they represent some of the obvious

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1 concerns that are evident from the surveys to date.
2 With this further research, we should be in a better
3 position to evaluate the various recommendations so
4 that they can be clarified, justified and implemented
5 to protect the fisheries resource.

6 MR. ANTHONY: I propose to now
7 turn to Mr. Millen. Would you like to have a break?

8 THE COMMISSIONER: Well, I
9 think we'll adjourn for coffee now.

10 (PROCEEDINGS ADJOURNED FOR A FEW MINUTES)

11 (PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

12 MR. ANTHONY: Mr. Commissioner,
13 I'd like to now turn to the evidence of the final pan-
14 elist that's being presented this afternoon, Mr. Millen.

15 Q Mr. Millen, would you
16 describe your association with the Mackenzie Valley
17 Pipeline assessment and indicate the design and con-
18 struction issues you feel require special attention?

19 WITNESS MILLEN: My associa-
20 tion with the Mackenzie Pipeline proposals began in mid-
21 1971 when I took up the position of Head of Resource
22 Impact Division in the Central Region of the Fisheries &
23 Marine Service. The Central Region takes in the
24 entire Mackenzie Valley region. My responsibilities
25 encompassed the protection of fish habitat in the
26 Northwest Territories from the effects of industrial
27 impacts ranging from highway building to hydro-electric
28 development. The fishery studies in that region con-
29 ducted for the Northern Pipeline Environmental Social
30 program of the Canadian Government were managed within

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1 the Resource Impact Division, so as an engineer I
2 did not actually take part in the biological research.
3 I've been extensively involved in the environmental
4 review of the Mackenzie Highway design, and in recommen-
5 ding terms and conditions for the protection of fish
6 habitat in water licences issued by the Northwest
7 Territories Water Board.

8 The purpose of my testimony
9 is to relate the conclusions drawn by my colleagues
10 Messrs. Stein, Steigenberger and Walker to some of the
11 more important requirements for engineering design of
12 the pipeline and for regulatory activity to protect
13 the fish resource.

14 The applicant has demonstrated
15 a considerable knowledge of the aquatic environment
16 and of the measures that can be taken to protect or
17 restore the environment. They have also identified
18 areas where their interest in the integrity of the
19 pipeline coincides with the need to preserve the
20 environment. For example, they have indicated much
21 concern for the prevention of erosion at locations where,
22 as a result of erosion, the pipeline could be exposed.
23 My purpose is to identify some aspects of design and
24 construction which are equally necessary to protect the
25 environment, but are not directly related to pipeline
26 integrity.

27 The work done by Mr. Stein and
28 his colleagues in the Mackenzie Valley has identified
29 the mouths of streams at their confluence with the
30 Mackenzie River as particularly important to the fishery

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2 resource. The applicant has indicated that the majority
3 of the wharf sites and staging areas will be adjacent
4 to these areas. Particular attention will have to be
5 paid to the detailed siting and design of these areas
6 if the fish resource is to be protected. The wharf sites
7 and staging areas will be long-term operations. In
8 fact in the light of probable future development, they
9 should be considered as permanent installations. The
10 siting of wharf facilities and backup areas should be
11 located as far as possible from the sensitive area of
12 the stream mouth. In addition, the disposal of
13 wastes of any kind into these stream mouths must be
14 avoided and withdrawal of water must be carefully regulated.
15 For the protection of the aquatic resource,
16 final design should provide an adequate buffer zone
17 between cleared areas and the stream high water mark.
18 The main purpose of these zones is to ensure that surface
19 runoff water quality is maintained. Additional
20 advantages include the retention of natural stream bank
21 erosion protection, of shade trees and of aesthetic values.
22 The buffer zone width considered acceptable in the
23 design review of the Mackenzie Highway was 300 feet.
24 If this distance cannot physically be met, special
25 measures to control surface drainage may be required.

26 Access roads to wharf sites are
27 also of concern because of the sensitivity of the
28 nearby fishery resource and long-term use. Many of
29 these access roads are planned as winter roads only.
30 Most of them have to ascend several hundred feet from

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2 river level to the benchland where the pipeline is
3 located. These roads must be constructed so that
4 they are not subject to erosion at any season. This
5 requirement presents no difficulty^{where} the surface
6 vegetation mat is little disturbed. However, on the side
7 hill grades which will be encountered climbing out of
8 the stream valleys, some earthwork will be necessary
9 to provide a road bed. Alternatively, extensive ice
10 road building will be required. Here, erosion control
11 measures and drainage provisions comparable with that
12 required for an all-weather road will be required.

13 Stream crossings are of major
14 concern to those interested in protecting the fishery
15 resource. I wish to refer to the minor stream crossings,
16 those that are built by the regular pipeline contractor
17 as he comes to them. I understand that in the two
18 Territories there will be about 150 to 200 crossings
19 which will have a specific design and a further 400
20 where one of a number of standard designs will be used.
21 I wish to emphasize the necessity of setting out as
22 part of the design, the stream crossing procedure and
23 remedial measures for each of these crossings. On the
24 site, in the winter, it is often difficult even to
25 locate these small streams, let alone make any judgments
26 on the restoration measures required.

27 Items to be addressed in the
28 environmental design of every minor stream crossing must
29 include:

30 (a) What the contractor must do to allow the continued

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1 flow of any water encountered. This would include the
2 temporary problem of maintaining flow during construc-
3 tion and the long-term problem of maintaining flow past
4 the ice bulb around the chilled pipeline.

5 Mr. Commissioner, I should like
6 to add that I envisage more frequent occurrences of
7 both the long and short-term aspects of this problem
8 than the applicants have identified. On a ground
9 traverse of the winter road along the east side of the
10 Mackenzie between February 14th and 19th in 1973, I
11 observed 20 streams and rivers from the Willow Lake
12 to the Great Bear River which had detectable free
13 water flow. The Arctic Gas catalogue of lakes and
14 streams describes only 16 streams altogether in this
15 stretch.

16 THE COMMISSIONER: How many did
17 you locate?

18 A 20.

19 MR. MARSHALL: Sorry, could you
20 repeat that?

21 A From February 14th to
22 the 19th, 1973. In addition rivers, such as the
23 River Between Two Mountains and the Saline River,
24 which I noted as dry at that time, most likely con-
25 tained sub-gravel flows. With regard to the long-term
26 aspects of the problem, the small streams which flow
27 through musket in my observation do not freeze down to
28 the bottom in all cases and the creation of a barrier
29 such as a road berm or a frozen pipeline surrounded
30 by a large sleeve of ice could result in two undesirable

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1 effects . These effects are the disruption of the stream
2 flow and the accumulation of the large surface icing
3 which is capable of destroying surface vegetation and
4 re-channelizing spring flows.

5 (b) of the items to be addressed in the environmental
6 design is what clearing, if any, beyond the right-of-
7 way width would be permitted for, say, access roads
8 down to the stream level where the banks are quite
9 steep.

10 (c) What the contractor may do with reject spoil
11 excavated from the trench or any other debris arising
12 within the approaches to the crossing

13 (d) What class of backfill the contractor may use in
14 the trench within the active flood plain

15 (e) To what extent stream banks may be graded for the
16 pipeline approaches.

17 (f) What additional grading for vehicular access down the
18 stream banks would be permitted.

19 (g) In detail, what restorative measures will be
20 undertaken, particularly for bottoms and sides of the
21 graded approaches to the streams. From a fisheries point
22 of view, the success of the revegetation and restabili-
23 zation program is critical for assessing potential
24 environmental impact.

25 (h) Any limitations on timing of activities, particularly
26 restorative and erosion protection activities, which
27 may require spring or summer work.

28 In the case of more extensive
29 or other permanent works within an active flood plain,
30 such as a road crossing or borrow pit, even more

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2 extensive specifications would be necessary. The
3 applicant's construction schedule shows the construction
4 of winter roads starting in October. This raises a
5 serious concern with respect to stream crossings. I have
6 observed many of the streams between the Willowlake
7 River and the Great Bear River running open in October.
8 These could not be crossed by any form of ice bridge.
9 If the applicant intends to maintain this construction
10 schedule, he should plan for some form of temporary
11 bridging as an alternate method of stream crossing.

12 Q As senior engineer of
13 the environmental protection group of the Department
14 of the Environment, Pacific Region,
15 do you have any comments on the
16 enforcement of environmental protection terms and conditions?

17 A In enforcing the requirements
18 to protect fish, one must revert to the mandate
19 provided by the Fisheries Act. One aspect of that
20 Act that should be pointed out at this stage is that it
21 does not discriminate amongst fish when it comes to
22 environmental protection. That is the environmental
23 protection provisions apply to all fish, not only to
24 those deemed to be significant populations or valuable
25 species. For example, Section 30 of the Fisheries Act
26 states:

27 "The eggs or fry of fish on the spawning grounds
28 shall not at any time be destroyed."

29 And in Section 33, it prohibits the deposits of
30 deleterious substances "in water frequented by fish."

1 In the Yukon Territoy, Fishery Regulations made
2 under the Fisheries Act include, in Section 9, the
3 directive that no person shall use any explosive
4 for any purpose in water frequented by fish. (In the
5 Northwest Territories the use of explosives may be
6 permitted under a licence issued by the Minister
7 pursuant to the Northwest Territories Fisheries
8 Regulations.) The other principal powers for
9 the protection of fish habitat are : Under section
10 20, the requirement to provide passage
11 past an obstruction for migratory fish and, in Section
12 20 (10), the requirement to allow flow of water past
13 such obstruction for the safety of fish and the
14 flooding of spawning grounds.

15 A review of the Fisheries
16 Act reveals that most of the provisions do not
17 involve approval, permitting, or reviewing proposals
18 and designs. (The exceptions to this are Section 20
19 with regard to obstructions and Section 33 in the
20 case that a work on completion is likely to result in the
21 deposit of a deleterious substance.) As a result,
22 a system of final design review and enforcement of
23 environmental protection measures by an approving author-
24 ity would have to be created, it does not flow from the
25 existing provisions of the Fisheries Act.

26 However, a substantial body
27 of experience has been built up of consultation
28 between pipeline construction companies and the Fish-
29 eries Service. In the Pacific Region, plans for
30 stream crossings are submitted in advance and reviewed

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1 by Fisheries Service. Under the provisions of the
2 British Columbia Gravel Removal Order, a permit is required
3 from the Regional Director of Fisheries to excavate
4 gravel from scheduled rivers. This experience in
5 British Columbia resulted in the publication of
6 Technical Report 1973-2 now entitled "Pipeline Construction
7 Guide, Central and Southern British Columbia,
8 July 1974" by the Department of the Environment,
9 Fisheries and Marine Service, Pacific Region. Similar
10 design review procedures have been in effect in the
11 Northwest Territories for all permanent stream crossings,
12 mainly road crossings.

13 MR. ANTHONY: Mr. Commissioner,
14 the Technical Report 1973-2, that's updated printing and
15 information that is tabled as the next exhibit.

16 A Such design
17 reviews are essential in the general case because
18 normal engineering design does not take
19 into account all the requirements of fish. Even
20 after much investigation, and the publication of the
21 Guidelines, noted by Mr. Stein, a review of highway stream
22 crossings was still required by Fisheries and Marine
23 Service in the Northwest Territories. Such reviews are
24 necessary because the Guidelines must allow latitude
25 for judgement. Biological judgement is usually applied
26 first, in assessing the use of the stream by various
27 fish species. Judgment is used because while it
28 may be easy to positively determine that some species
29 are present, it is time consuming and expensive
30 to prove the absence of any species from a given

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1 stream. Consequently limited sampling information
2 is usually augmented by observations of the stream's
3 nature and size. A judgment is made whether, for
4 example, fall spawning fish are likely to use the stream.
5 The judgment of a hydrologist will then be incorporated
6 in the selection of the design discharge, and so on.
7 the regulatory stipulations have allowed latitude
8 for these judgments, an appropriate and economical design
9 can be devised for each stream crossing. However, it is
10 then advisable to conduct a review of the design, by the
11 regulatory authority, to ensure that the level of pro-
12 tection provided for the fish resource is acceptable.

13 The alternative would be to
14 provide stringent, highly specific and universally
15 applied stipulations for stream crossings. A simple
16 enforcement procedure would then be all that is required.
17 The difficulty with this approach is that it does not
18 allow for site specific variation and is a very costly
19 method of achieving environmental protection.

20 I suggest that when this Inquiry
21 comes to consider what stipulations are necessary to
22 protect the fish resources it must, at the same
23 time, consider the nature of the design review process
24 which will be required. The latitude of the stipulations
25 must be matched by the extent of the design and con-
26 struction review. I would recommend, further, that a
27 system be devised that would combine stipulations that
28 allow site specific variation based on assessment of
29 each stream crossing with a detailed design review
30 process that will ensure the environmental protection

Stein, Walker
Steigenberger, Millen
In Chief
Cross-Exam by Bell

1 measures are implemented and enforced. One
2 must go with the other if protection of the fish resource
3 is to be achieved. More detailed presentations on how
4 this can be achieved in practice will, I expect, be made
5 in the implementation and regulation stage of this
6 Inquiry.

7 MR. ANTHONY: Thank you,
8 Mr. Millen. That is the evidence of this panel,
9 Mr. Commissioner, and they are now available for
10 cross-examination by any of the other participants.

11
12 MR. RYDER: I think my understand-
13 ing is that Marshall may be prepared to start.

14 MR. MARSHALL: I believe that
15 Mr. Bell has questions. I think the ordinary order
16 would be that I would be next to last. Mr. Bell has
17 a question. I understand that some of the other
18 counsel are not prepared to go ahead. I would be
19 prepared to get started today. I don't think that I
20 can complete it though.

21
22 CROSS-EXAMINATION BY MR. BELL:

23 Q Yes, just one area for
24 you, Mr. Stein. Do I understand correctly when you
25 are discussing the East of the Franklins Route, that
26 your comments there were limited to an assessment--
27 to an assessment of the potential impact on fish and
28 their habitat in that general area?

29 WITNESS STEIN: Yes, that
is the case.

Stein, Walker
Steigenberger, Millen
Cross-Exam by Bell

Q And would you agree with me that there may well be socio-economic factors which might render this route unsuitable?

A I am sorry, I missed that --

Q Would you agree with me that there may well be socio-economic factors which might render this route unsuitable.

A I would assume that that is a possibility, sir, but that is far from being in my area, I think.

MR. BELL: Thank you very much.

MR. MARSHALL: Sir, I think a bit of a problem presents itself, and Mr. Anthony may wish to comment on it. I, at this point have not been able to consult with all of the advisors that I wanted to speak to with respect of this cross-examination. I hadn't realized soon enough last week that there were matters of an engineering nature included within the evidence, that I ought to have Dr. Harlan and Dr. Hollingworth and others -- Dr. Hollingshead and others comment upon, so I am prepared to get started, sir, but I don't think that I will be able to complete the cross-examination now. It is possible I will be able to do so later in the week if I have been able to consult with these other people.

Ordinarily my cross-examination would be next to last, and I am prepared to start now, if

Stein, Walker
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Cross-Exam by Marshall

1 MR. Anthony doesn't object to me splitting the
2 cross-examination.

3 MR. ANTHONY: I have no
4 particular comment. I hope they would proceed in what-
5 ever way is most convenient for Mr. Marshall and the
6 other counsel.

7 THE COMMISSIONER: Well, if
8 you are ready to go ahead, Mr. Marshall, go ahead
9 and we'll see how far we get and if you run out
10 of material that you feel is in shape to be put to
11 the witnesses, just tell us and we will turn to someone
12 else or adjourn if we have to.

13 MR. MARSHALL: Thank you,
14 sir.

15 CROSS-EXAMINATION BY MR. MARSHALL:

16 Q I would like to start
17 with Mr. Stein. I refer you to a comment on page
18 3 of your evidence, near the middle of the page under
19 your concerns, you say:

20 "My greatest concern is that we do not possess
21 sufficient environmental knowledge to ensure
22 protection to all fish resources, nor are we
23 likely to in the time frame being considered."

24 Then over on page 17, again in the middle of that
25 page you say:

26 "The general conclusion is that provided proper
27 precautions and procedures are incorporated
28 and provided these procedures work, environmen-
29 tal degradation resulting from construction

Stein, Walker
Steigerberger, Millen
Exam by Marshall

should be minor and of short duration,
however, the potential for long-term impacts
arising both from the pipeline project itself
and associated industrial and other develop-
ments does exist."

Now, the last sentence in that second quote, I want
to get back to you on it at a later point. But it
just seemed to me, Mr. Stein, and I'd ask you to
comment on this, that there is really a contradiction
in the two statements. You seem to be telling us
that, first, on page three, that we don't have enough
information, and on page 17 you seem to be indicating
that certainly with respect to short-term impacts,
you have got a handle on those. Would you like to
elaborate on that?

A Well, I think what I
was referring to there, sir, was that there are many
areas that I feel we do not have sufficient information
on. There are many species which I have referred to
in my testimony -- well, I am sorry -- I have referred
to some as being major species -- there are many minor
species which really have received no study whatsoever,
or very little. There are major gaps, I think, in
identifying critical habitat areas. By this, I mean,
spawning, rearing, overwintering. This is further
complicated by the type of season that we are really
looking at being the winter, and what I think I really
was getting to, in the remark on page 17, was that I think
that we have a fairly good data base for many species
and that in my opinion if the guidelines and

2 recommendations that are made in this testimony, we
4 would be fairly close, I think, to completing the
6 picture.

4 Q I am sorry, could you
5 repeat that last comment?

6 A I was saying that if
7 we take the existing data, plus the data I would hope
8 to obtain if provision was made for the guidelines and
9 the recommendations that I have in this testimony,
10 then we should be in a fairly good position to control
11 most of these, short-term at least, impacts.

12 Q I understand that the
13 area that you have been involved in is the Mackenzie
14 and its tributaries, is that correct?

15 A That is correct.

16 Q Your work hasn't
17 related to the North Slope in the Yukon?

18 A Not to any great deal,
19 no, sir. We've had obviously tag return exchanges and
20 so on.

21 Q I believe Dr. McCart in
22 his evidence indicated that generally speaking his
23 work was concentrated on the North Slope and that
24 the work of the Federal Government was being concentrated
25 in the Mackenzie and its tributaries and this was done
26 through some discussion so that there would not be
27 an overlap in the research that was under way. Are you
28 familiar with that situation, sir?

29 A I am not familiar that
30 Mr. McCart made that statement, no. I will say though,

Stein, Walker
Steigenberger, Millan
Cross-Exam by Marshall

1 that obviously there was a tremendous amount of money
2 and energy being expended on this particular project
3 both by government and the applicant and through the
4 permitting system whereby anyone who is sampling fish
5 populations in the N.W.T. must apply to Fisheries
6 and Marine Service, Central Region for a sampling
7 permit. It was a very useful tool, I think, in
8 eliminating a lot of the duplication. I think from
9 what I am aware of, at least, that Mr. McCart, I think,
10 has done an extensive amount of work in the N.W.T.
11 portion of it.

12 THE COMMISSIONER: An
13 extensive amount of what?

14 A An extensive amount
15 of work in the Mackenzie Valley, especially his
16 winter surveys.

17 THE COMMISSIONER: Especially
18 what? Sorry --

19 A Especially his winter
20 survey work.

21 THE COMMISSIONER: His
22 winter survey work.

23 MR. MARSHALL: In the areas
24 where you think the information ought to be improved
25 relates to the minor species which you say have not
26 been adequately studied and further identification of
27 critical habitat areas, those were the two that you
28 specifically commented on?
29
30

Millen, Steidenberger,
Walker, Stein
Cross-Exam by Marshall

1 A I mentioned the fact that
2 we do not have any great volumes of information on
3 the minor species. I would not, I don't think, suggest
4 that we extend that much effort on it. I am pointing
5 that out as a loophole in the work that we have done.
6 But I think that any further research and effort should
7 really go in to perhaps improving on the data that we
8 have on these major species and yes, I would say that
9 a goodly portion of this should go towards identifying
10 critical habitats.

11 Q Is the government presently
12 involved in additional programs that would fill some
13 of the gaps that you have identified?

14 A Referring specifically
15 to the Mackenzie Valley?

16 Q Yes.

17 A Yes. There are some. Did
18 you want me to list these?

19 Q Yes, perhaps you could
20 just review the programs that are underway.

21 A Okay, some of them are
22 on a greater scale than others. One that is actually,
23 I guess I should point out, is actually in the com-
24 pletion stage and that is our Beaufort Sea Program.

25 Q Beaufort Sea Program?

26 A Right. This was a review
27 or I am sorry, a study of the fish resources, the fresh
28 water fish resources in the outer delta region.

29 Q When will that report be
30 completed?

Millen, Steigenberger,
Walker, Stein
Cross-Exam by Marshall

1 A The staff in my division
2 are responsible for actually two reports, one was a
3 technical report based on our own research. That report
4 I believe has been completed and has been submitted to
5 the Beaufort Sea Office in Victoria. I don't know how
6 it stands within their office right now.

7 The second report that
8 these people will be responsible for, is an overview
9 report which will essentially tie together the work of
10 several research people involving marine species, fresh
11 water species, primary productivity, effects of oil,
12 and so on into one neat little impact statement, you
13 might say, although that's a poor term to use, perhaps.

14 That one, right now, is
15 I would say, far from being even in a complete draft
16 stage.

17 Q Will the overview
18 report have regard to work done by scientists outside
19 of government? That is, for example, the work of
20 Slaney that has been done in the delta?

21 A It would certainly take
22 into account. Yes, most of that work.

23 Q Mr. Anthony, I wonder if
24 you might --

25 A Did you want me to finish
26 my question, sir?

27 Q I will get back to you in
28 just a second.

29 A Sorry.

30 Q About the first report --

Millen, Steigenberger,
Walker, Stein
Cross-Exam by Marshall

1 the technical report --it is a matter that would be of
2 some interest, I think, to all of the participants in
3 view of the fact we will be going to the delta
4 area in the new year. Perhaps you or Commission Counsel
5 could look into that matter and see that the report
6 might be available.

7 THE COMMISSIONER: I think
8 Commission Counsel should.

9 Q I am sorry, you wanted
10 to continue with your answer.

11 A I assumed you wanted me
12 to.

13 I would say the majority
14 of the other work that we are presently conducting be
15 it in various stages whether it is report writing or
16 field work, planned field work, proposed field work
17 would be more in regards to highway construction.
18 I would say also that the emphasis is probably right
19 now on the engineering side rather than the biological
20 side because as I am sure you are aware of, the biology
21 or the biological information rather that has been
22 collected through the pipeline project will be equally
23 applicable to the highway project.

24 There are some streams
25 which we are still looking at, both in which construc-
26 tion has occurred, some of which is being proposed.

27 THE COMMISSIONER: Mr. Stein,
28 would you pull the microphone a little closer to you
29 if you don't mind?

30 A Is that better?

Millen, Steigenberger
Walker, Stein
Cross-Exam by Marshall

THE COMMISSIONER: Yes.

Q Mr. Stein, is this work with respect to the Mackenzie Highway only or does it include the Dempster as well?

A Right now, it is just the Dempster, oh I am sorry, just the Mackenzie.

Q And what stage of preparation is that report at, sir?

A A lot of the things that I was referring to, I wouldn't say would be presented on the basis of a report. It would enter more into the review of design packages for the highway.

Q I see. Do I take it then that there is not a report relating to impact of highway construction on fish in preparation?

A No, that is not entirely correct. It was in references that I was just making. There is a further study that we are involved with. It is entitled -- well, the project is the Mackenzie Highway Monitoring Project. We are looking at, right now, approximately, three streams, I believe, which have not yet been crossed by the highway. We are looking at a long term study such that we will be able to have at least one year pre-construction data, another year to follow it through the construction phase, and two years of post-construction monitoring.

Q What areas will this monitoring work be done in?

A What streams, do you mean or, as I say there are three --

Millen, Steigenberger
Walker, Stein
Cross-Exam by Marshall

1 Q I would like an indenti-
2 fication of where the studies would be done, if you
3 are able to give that.

4 A That is probably the one
5 piece of information I didn't bring with me. One is
6 Smith Creek, the other two are unnamed tributaries and
7 I doubt if I could locate them on a map for you right
8 now. They would be south of Smith Creek.

9 Q Unnamed tributaries in the
10 Mackenzie?

11 A Right.

12 Q I see. Are there other
13 disciplines that are being examined in this monitoring
14 study at this same location. For example, is vegetation
15 being examined or mammals or birds?

16 A There are several agencies
17 that are involved in the overall monitoring program.
18 There are none to my knowledge that are specifically
19 located on those sites. No, sir.

20 Q Do I take it then that
21 in other disciplines monitoring programs have been
22 established for other locations?

23 A I believe so, yes.

24 Q And these are to monitor
25 the impact of the highway construction?

26 A That is correct.

27 Q Does that complete your
28 list of the programs that are presently underway, sir,
29 relating to the Mackenzie and its tributaries?

30 A There was further work

Millen, Steigenberger
Walker, Stein
Cross-Exam by Marshall

1 done on the Great Bear River related to hydro development.
2 That report, that work is completed and the report is
3 in a rough draft state right now.
4

5 Q Can you give us a date
6 when it is anticipated that report will be available?

7 A I have been asking for
8 that same piece of information myself. I would guess
9 it would probably be a matter of months right now. Say,
10 three months, four months.

11 Q Sir, on the top of the
12 third page of your prepared evidence, you comment on
13 objectives. Objective number four, "to identify areas
14 normally fished domestically^{and} to obtain an estimate of
15 the quantities of fish taken." Is there a separate
16 report on domestic fisheries that has been prepared by
17 the Service?

18 A No, sir, there is not.

19 Q I take it then the infor-
20 mation is scattered through the other reports.

21 A That is correct, yes.

22 Q Sir, on page four, of
23 your evidence, you make the following statement in the
24 middle paragraph.

25 "Stream gravels may contain the incubating eggs
26 of fall spawning species, including the whitefish,
27 ciscoes, inconnu, and Arctic char.

28 Sir, with respect to whitefishes, ciscoes, and inconnu,
29 can you identify any area where incubating eggs might
30 be found in stream gravels within one or two miles
downstream of any proposed pipeline crossing?

Millen, Steigenberger
Walker, Stein
Cross-Exam by Marshall

1 A I am not sure, or I know
2 for a fact right now, I could not give it to you that
3 specifically. The information would be scattered
4 throughout our reports. There would be other problems
5 I think, in relating it specifically to the crossing
6 site, but I would say that yes, for the spawning
7 locations that we are aware of, we -- there may possibly
8 be some but this is one area as I say, that I think the
9 data on both the Applicant's and probably government's
10 parts is probably quite lacking. It is not an easy
11 task by any means.

12 Q There is nothing
13 specifically that comes to mind. There is no specific
14 location that you can relate at this time?

15 A I don't think I could, no,
16 sir, especially for those species because those parti-
17 cular ones, the coregonids, are the most difficult
18 to track.

19 Q Sir, over in the fifth
20 page of your prepared evidence, in the paragraph that
21 begins on the preceding page, you say in the last sentence
22 when making reference to the Ochre River, "Considerable
23 weekly variation in flows have also been observed during
24 winter."

25 It wasn't clear to me, sir,
26 whether or not you were dealing with the period after
27 freeze-up, or was this prior to freeze-up?

28 A You are making reference
29 to the comment on weekly variation?

30 Q Yes.

Millen, Steiqenberger
Walker, Stein
Cross-Exam by Marshall

1 A I don't think that there
2 was any comment there made specifically about the Ochre.

3 Q I had read the second last
4 sentence as being related. You say,

5 "the Ochre River is one such example. Considerable
6 weekly variation of flows have also been
7 observed during winter."

8 What river were you
9 making reference to then in the last sentence?

Stein, Walker
Steigenberger, Millen
Cross-Exam by Marshall

1 A I see your point. I
2 think that was meant more as a general statement of
3 rivers at that time of year, and not really specifically
4 at the Ochre.

5 Q Do you have the details
6 as to the locations at which these observations were
7 made, and the data that was collected in any specific
8 place, or is this again something that's scattered
9 through your reports?

10 A I would say that probably
11 there is little in reference to changing flow conditions
12 in the reports. This was based really more on the
13 observations of Mr. Millen and his work and reviews of
14 the area. I don't know, perhaps Mr. Millen would wish
15 to comment on that.

16 Q Perhaps you could, Mr.
17 Millen. It would be helpful if you could comment on
18 that. Are you with me on page 5 of Mr. Stein's --

19 WITNESS MILLEN: Yes, I have
20 the section you are referring to. I believe Mr.
21 Stein in his statement referred to flow conditions..
22 We didn't make observation of the discharge and the
23 observation reflects our knowledge of the changing
24 conditions that occur in these streams which have flow
25 under ice. Specifically, I could refer to my notes
26 of the Ochre River, which did indeed change in its
27 flow conditions at the winter road crossing between
28 the two crossings that we made, a couple of days apart.
29 Also at another fairly close stream, it's about 15
30 miles further north in the valley, known locally as

Stein, Walker
Steigenberger, Millen
Cross-Exam by Marshall

1 Hardship Crossing, an ice bridge where the flow condi-
2 tions changed drastically between the two times we
3 crossed it. This is also supported by observations
4 of our technician who spent one winter fishing the
5 Martin River where he said that the locations where he
6 was able to set nets under the ice in that stream
7 varied from time to time through the winter. That is
8 places where the stream was actually flowing at one
9 point in time, after a change in weather conditions
10 and so on would perhaps be frozen down and the water
11 would be in some other place, These are all, you might
12 say, qualitative observations rather than measurements
13 of discharge.

14 MR. MARSHALL: Are they found
15 in any reports that have been published?

16 A No, these are not
17 published.

18 Q Sir, I'd like to leave
19 the point for now. Dr. McCart is interested in the subject,
20 it may be that we'd like to get the details that these
21 gentlemen have made note of. I'll return to that later
22 after I've spoken to Dr. McCart.

23 Mr. Stein, on page 6 of your
24 evidence under the heading of

25 "Gravel removal"

26 you make a reference to the 300 feet guideline that
27 was employed to separate operations of gravel removal
28 from the active river channel, and you recommend that
29 this apply to pipeline construction also. Have you
30 found the reference near the bottom of page 6?

Stein, Walker
Steigenberger, Millen
Cross-Exam by Marshall

WITNESS STEIN: Yes sir.

Q I believe that this same 300-foot figure was also used in Mr. Millen's evidence pertaining to separation of stockpile areas from the rivers. Now I wanted to ask both of you gentlemen about this point. My concern with the 300-foot figure was that it seemed to me to be somewhat an arbitrary one, in that there would be some instances where perhaps 300 feet would be insufficient to provide an adequate safeguard, whereas on the other hand in some cases, because of site specific conditions, 300 feet might be too much, and it might be necessary to have access roads or whatever, that would go some distance greater than would really be necessary to ensure proper protection of fish. I was wondering whether or not you agree with that observation, in other words, 300 feet is perhaps a useful guideline but really there ought to be a site specific determination made.

A I would say that the 300 feet was meant to be a general guideline. It's one that has been used in the past and I think under similar operations, has been received as well as can be expected. I would say yes, that under certain circumstances that particular figure may be deviated from, one way or another. I think this is again subject to the fisheries officer or the environmental officer, whoever he may be on-site.

Q I understand that this figure was originally developed in connection with

Stein, Walker
Steigenberger, Millen
Cross-Exam by Marshall

1 construction of the Mackenzie Highway. Is that right?
2 Are you aware of that?

3 A That would be my recollec-
4 tion, yes.

5 Q Do you have any opinion
6 as to whether or not the 300-foot figure is a reasonable
7 one with respect to rivers on the North Slope?

8 A I would really suggest,
9 sir, that perhaps one of these gentlemen from the
10 Yukon would be probably better able to answer that.
11 I'm not really familiar with, I would venture to say
12 any of the streams on the North Slope. I don't know
13 whether it would applicable in that situation or not.

14 Q I see. Your remarks
15 were specifically directed to --

16 A Directed to the Mackenzie
17 Valley, yes.

18 Q I'll move on to them later,
19 I'll follow through in my notes as I prepared most of
20 my questions initially for you, sir. Now sir, on
21 page 8 of your evidence you talk about water use. I
22 was wondering, sir, whether you were aware that Dr.
23 McCart has recommended to Arctic Gas that wherever
24 possible water be taken from the Mackenzie rather
25 than from lakes or ponds?

26 A I don't believe I am aware
27 of that recommendation, no sir, but I would certainly
28 support it.

29 Q You say in the middle of
30 page 8, sir,

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Steigenberger, Millen
Cross-Exam by Marshall

1 "Here biological problems are likely to result
2 from extracting water from fishless lakes.
3 This may also be the case in deeper lakes,
4 depending in part on the depth of the lakes,
5 the degree of water level draw-down, and util-
6 ization of lakes by fish."

7 Then on page 9, sir, your third recommendation, you
8 say:

9 "For these reasons it is recommended that water
10 sources be permitted on an individual basis
11 subject to the applicant, No. 3, providing
12 documented proof that lakes indicated as being
13 fishless are indeed not utilized by the fish
14 resource at any time of the year."

15 It seemed to me, sir, that in view of the conclusion
16 on page 8 the suggested recommendation No. 3 may be
17 unduly restrictive, and I'd ask you if you would be
18 prepared to add the following proviso to the third
19 recommendation:

20 "Or in deeper lakes, that the volume required
21 would have no biologically significant effect
22 on water levels."

23 A I'm sorry, I read that --

24 Q Do you follow the point
25 I'm making? I'm suggesting that in light of your con-
26 clusions stated in the middle of page 8 that your
27 recommended restriction No. 3 is unduly restrictive.
28 You say you want proof that the lakes are not utilized
29 by the fish resource at any time of the year before
30 water would be withdrawn.

Stein, Walker
Steigenberger, Millen
Cross-Exam by Marshall

1 What I'm suggesting is that
2 that's unduly restrictive and asking whether or not
3 you would be satisfied in the event that it were
4 established that the volume required would have no
5 biologically significant effect on water levels, even
6 though there might at some time be fish utilization of
7 that water body.

8 A I don't think I would
9 agree with adding that, no. I would suggest to you
10 that if term No. 4 was met fully, in other words
11 predicting the biological and hydrological implications
12 of water extraction, that if it was met fully enough
13 to convince whoever the regulating authority or body
14 may be, can convince them that there will be ^{no} biological
15 impact resulting from that draw-down, then I think
16 really it's covered. I think that should be sufficient.

17 Q Fine.

18 A I see no reason for
19 changing that article three.

20 Q Sir, near the top of
21 page 9 you say in the first full paragraph:

22 "The eggs of fall spawning species including
23 the white fish, ciscos and Arctic char remain
24 buried in stream gravels throughout the winter
25 months , hatching in spring. "

26 Sir, I am advised that with respect to white fishes and
27 ciscos, they do not spawn in small streams. Is that
28 to your knowledge correct?

29 A No, I wouldn't say that it
30 was to my knowledge correct, as I say, particularly with

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Steigenberger, Millen
Cross-Exam by Marshall

1 the coregonid species there is considerable difficulty
2 in locating site specific spawning areas. Our indica-
3 tions are that especially with the ciscos they are
4 probably using smaller tributaries. Now of course we
5 should really go back and define what is small. We
6 also have indication that they are spawning, as I
7 mentioned in the testimony, at the mouth of the Arctic
8 Red River. That's a pretty big area.

9 Q Well, we're dealing with
10 withdrawal for purposes of obtaining water for con-
11 struction purposes, and I guess the test that I would
12 suggest is whether or not the withdrawal of the water
13 would be in sufficient quantities to have an effect on
14 the eggs. Now the point I'm trying to make is this,
15 sir, my information is that the spawning of white fish
16 and ciscos does not take place in small streams, at
17 least streams that would be so small the withdrawal
18 of the water in the quantities being proposed by the
19 applicant would be likely to have any effect.
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Millen, Steigenberger,
Walker, Stein
Cross-Exam by Marshall

1
2 MR. ANTHONY: We may be getting
3 hung up here on what is small. I wonder if Mr. Marshall
4 has any advice or examples of the sources of streams
5 he is talking about. It may assist the witness.

6 MR. MARSHALL: Well, I can
7 approach it from another direction. I understand that
8 the spawning takes place in streams, rivers, such as
9 the Mackenzie and the Peal and some lakes. From your
10 knowledge, do you know whether that is correct or not?

11 A No, sir, I don't believe
12 that is correct. As I say, we are still in a situation
13 of not locating specific sites but if I can perhaps use
14 the Peal as an example. We do know that there are
15 substantial runs of ciscoes that utilize that system.

16 We were informed, by talking
17 to the people that they are actually utilizing some of
18 the smaller tributaries again depending on your defini-
19 tion of small but relatively speaking they are small.
20 Off of the headwaters in the Peal region. We were not
21 successful in locating these. But that is the infor-
22 mation as best as we have it right now.

23 Q Could you identify those
24 tributaries?

25 A I am afraid I would have
26 to ^{go} back and dig it out of the report, sir.

27 Q Well, perhaps you could
28 provide that information, sir, I would appreciate it.
29 Do you have any other information which leads you to
30 conclude that other small streams are being used for

Millen, Steigenberger,
Walker, Stein
Cross-Exam by Marshall

1 spawning of whitefishes and ciscoes?

2 A Other than the Peal?

3 Q You mentioned tributaries
4 of the Peal. I was wondering if you had any other
5 examples of small streams that are being used for
6 spawning by ciscoes and whitefishes.

7 A Again I would say, speci-
8 fically, no, sir, because we have just not been
9 successful in locating these areas other than by second-
10 hand information.

11 Q Well, is it fair to say,
12 then, that since you haven't been able to identify
13 the spawning areas, you operate on the assumption that
14 there may be spawning in small streams or elsewhere?

15 A I would say it was a fair
16 assumption, yes.

17 Q Sir, over on page ten of
18 your evidence, you make reference to the domestic
19 utilization of Arctic char in the Big Fish River which
20 you say is threatening the population stability and you
21 referenced one of your studies. I wonder if you could
22 tell us a little bit about this, sir, something of the
23 numbers of fish taken and why you consider this a
24 problem.

25 A I think, sir, you would
26 find the data on that particular fishery on two/^{different} pages
27 of the Stein and others report of 1973, specifically
28 pages 57. There is another reference to it, on page
29 104. Based on the tag and recovery study that we did
30 on that particular population, we estimated and

Millen, Steidenberger,
Walker, Stein
Cross-Exam by Marshall

1 I am taking this from memory but I believe it was between
2 12 and I think 17,000. We, as I say, documented this,
3 we did our own calculations which I don't think appeared
4 in print and we estimated that perhaps this population
5 was being probably harvested to its maximum extent at
6 that time. We then turned it over to our management
7 division who has the responsibility for that, or in that
8 area and to my knowledge there has been no further work
9 done on it.

10 Q Let me just go into this
11 with you a bit. I understand it is a problem probably
12 related to access via snowmobiles, skidoos into that
13 area. Is that right?

14 A That was the feeling that
15 we had, yes.

16 Q And this is by people
17 resident in Aklavik?

18 A Primarily, yes.

19 Q Are records being kept
20 by the Fishery Service as to the numbers of fish being
21 taken from this location? You gave one statistic. I
22 was wondering whether that was a once and only estimate
23 or whether you are keeping regular records of this.

24 A Well, of course, we are
25 no longer operating there and are not keeping further
26 records. There is a fisheries officer at the present
27 time stationed in Inuvik. I don't think I could really
28 answer as to whether he is taking further notes or not.
29 I would suspect he may be but I could not answer that
30 positively.

Millen, Steigenberger,
Walker, Stein
Cross-Exam by Marshall

1 Q Sir, you may have testi-
2 fied on this. I am not sure that I caught it correctly.
3 Could you give an estimate as to the size of the
4 population, total size of the population?

5 A I think our estimate was
6 somewhere between 12 and 17, 000.

7 Q Yes, and from your
8 observations and information, can you tell us what
9 the catch is?

10 A I couldn't offhand, no, I
11 am not quite sure whether that appears in the catch
12 figures in the Stein Report or not. Again, I would
13 have to refer back to the Report to get an exact figure
14 on that.

15 Q I take it that the catch
16 in any event is of such a size that in your view it is
17 threatening the population stability?

18 A We felt that any further
19 harvesting beyond what they were taking at that time,
20 that is what you might call a historical fishery. It
21 is not something that has boomed simply because of the
22 use of skidoos. We felt that -- I would just give an
23 opinion here -- that at the existing harvesting levels
24 there may not be too great a problem. However, if there
25 is an increase in the pressure, be it through the
26 fishery itself, or be it through sport fishing, or
27 perhaps connected with the pipeline crew, perhaps
28 not, we have felt that that increase might jeopardize
29 the stability of that population, yes.
30

Millen, Steigenberger
Walker, Stein
Cross-Exam by Marshall

1
2 Q The information I had, sir,
3 and you may correct me if I am wrong is that while it
4 may have been a historic fishery, the extent of
5 utilization of that resource has increased rather
6 dramatically in recent years because of access now
7 being available via skidoos.

8 A I would say that that
9 would probably be a reasonable conclusion, sir, but we
10 do not have catch figures from previous years to base
11 that on.

12 Q Are you aware of any steps
13 that are being taken by the fisheries officer or by the
14 community concerned to manage that resource to ensure
15 that the food source is not jeopardized?

16 A No, I am not, sir.

17 Q With respect to construc-
18 tion timing, page 12 of your evidence, you say, "however
19 each system should be judged individually before
20 preceding and in circumstances where it can be shown that
21 there would be no detrimental effects on the fish
22 resource, construction could proceed even during these
23 periods."

24 So, I take it, sir, that
25 your approach is to favour really a site specific
26 assessment of these situations rather than work from
27 predetermined and somewhat rigid rules.

28 A I certainly would but
29 again that is a very costly and time-consuming
30 proposition, I think.

Millen, Steigenberger
Walker, Stein
Cross-Exam by Marshall

1
2 Q What, having these site-
3 specific assessment at the time.

4 A Yes. I meant that remark
5 by the way regarding only the timing of migration.

6 Q Sir, you deal in your
7 evidence with sensitive systems, beginning at page 12.
8 You make reference to a number, a few I want to ask you
9 about. Swan Lake Creek, Three Day Lake- Stewart Creek
10 drainages. Can you tell me where those are, sir?

11 A The Swan Lake system, I
12 believe is a tributary system of the Arctic Red, I
13 believe just upstream from the town of Arctic Red, the
14 settlement of Arctic Red. The Three Day Lake system
15 enters into the Mackenzie from the west side just
16 south, I believe, of Norman Wells.

17 Q The Three Day Lake-
18 Stewart Creek system wouldn't be affected by either of
19 the pipeline projects.

20 A Presumably not.

21 Q And the Swan Lake Creek
22 area would be somewhat upstream of the crossing of--
23 or upstream of the route of the interior alternative
24 route proposed by Arctic Gas?

25 A I would have to take your
26 word for that, sir, I am not quite sure where the
27 alignment comes in relation to that system. However,
28 I would probably want to see the final design alignment
29 on that as well before --

30 Q Sir, further down, you
mention the Rabbitskin, Liard and Martin Rivers, do you

Millen, Steigenberger,
Walker, Stein
Cross-Exam by Marshall

1 know whether or not the pipelines cross those?

2
3 I understand the Arctic
4 Gas proposal would not cross any of those.

5 A The Rabbitskin, I think,
6 no, would not, the Martin on the basis of the Simpson
7 alternate route would no longer cross. I am sorry
8 what was the third one?

9 Q The Liard.

10 A The Liard, no, it would
11 not on the new Simpson alignment.

12 Q Yes. Sir, at the bottom
13 of page 13, you make reference to the mouth of Arctic
14 Red River. You say, "in some instances such as the
15 mouth of the Arctic Red River, we feel certain that
16 spawning does occur." It is my information that the
17 Arctic Gas line didn't cross that river, sir, do you
18 know anything about that?

19 A Whether the Arctic Gas
20 line would cross the Arctic Red?

21 Q Yes.

22 A On the -- I am not certain
23 if the original, which I think would be the interior
24 alignment. I am not certain whether that would cross.
25 I think the new cross-delta proposal would not.

26 Q I am instructed that
27 neither alignment would.

28 A I will have to take your
29 word for that.

30 Q I just wanted to check
that.

Millen, Steigenberger
Walker, Stein
Cross-Exam by Marshall

1
2 I gather though that the
3 Dempster Highway does cross the Arctic Red River really
4 right at the community.

5 A That is correct.

6 Q Have you investigated the
7 potential impact of that highway crossing of the Arctic
8 Red might have on the spawning area at the mouth of
9 the river?
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Stein, Walker,
Steigenberger, Millen
Cross-Exam by Marshall

1 A No, we have not, sir,
2 and I believe, it is my understanding that that will be
3 a ferry crossing.

4 Q Sir, you deal with
5 methanol, beginning at page 14 of your testimony.
6 Now, sir, I will agree with you that methanol is
7 toxic, but ^I suggest to you that it is not highly
8 toxic as you suggest.

9 MR. ANTHONY: I am sorry, but
10 is this Mr. Marshall's professional opinion or is
11 he trying to elicit a further comment from the
12 witness as to what he means?

13 MR. MARSHALL: I would like
14 the witness to comment on that.

15 A Well, I suppose what
16 really is needed is a definition of "highly".

17 Q Well, I understand that
18 relative to other chemical substances, for example, the
19 various types of insecticides which can kill fish in
20 concentrations of a few parts per billion that methanol
21 is relatively non-toxic, relative to such materials as
22 that.

23 A I don't think that I could
24 really answer that question, sir. I am not really
25 involved in toxicology work. I couldn't really
26 -- I don't think I should even give an opinion as to
27 whether certain insecticides would be more toxic than
28 methanol or not. I think that there would be other
29 people more qualified to answer that than myself.

30 Q I take it that you accept

Stein, Walker,
Steigenberger, Millen
Cross-Exam by Marshall

the statement from the Biological Report Series that methanol in concentrations of 1% does not kill fish. I understand the exposure there was for periods of approximately 96 hours, you accept that finding, do you, sir?

A I think I would accept that, yes.

Q And it is still your feeling that a substance of that sort should be categorized as highly toxic?

A At 1%?

Q 1%.

A At 1% I would have to say that methanol is not highly toxic to fish.

Q Sir, near the bottom of page 15 you say:

"Otherwise a freeze depressant which has been thoroughly investigated and demonstrated to be less toxic than methonal should be sought. "

I was wondering if you knew of any?

A No, sir, I do not.

Q You discuss the use of hot water for testing, and as I read your evidence you prefer that method to the use of methanol, would that be correct?

A I would say that if that particular technique is feasible, then, yes, I certainly would prefer it over methanol.

Q There has been fairly

Stein, Walker,
Steigenberger, Millen
Cross-Exam by Marshall

considerable evidence given before this Inquiry, sir, on the use of a warm water testing procedure and I suggest to you, sir, that there are a number of aspects involving the use of warm water testing that have environmental implications such as the much greater volume of water that would be required for that sort of a testing method. The evidence has been given that there'd be several times the requirement for water if warm water testing were used than water methanol testing were used. Would you agree that that would be a significant environmental concern in your judgment?

A Well, again I would say that you would or should really refer to the comments that I made under the heading of "water use." It would obviously very considerably with the existing hydrology and biology of the system being taken from. If you would like an additional comment I would say that probably if it was being drawn from the Mackenzie River, there would likely be a minimal effect.

Q It is a function of where it is being taken from?

A Pardon me?

Q It is a function of where it is being taken from?

A Yes.

Q Now, sir, at the bottom of the page you suggest further studies be undertaken. I was wondering if you could specify what further

Stein, Walker,
Steigenberger, Millen
Cross-Exam by Marshall

1 studies ought to be undertaken with respect to the
2 use of methanol?

3 A Well, to my knowledge,
4 the work that has been conducted to date has been on
5 two species only. I would certainly like to see
6 futher toxicity work done with other northern
7 species. I would like to see experimentation
8 using invertebrates and I would also like to see
9 followup studies done in the field under field condi-
10 tions.

11 Q Would you expect other
12 species to be more sensitive than grayling or Arctic
13 char?

14 A Again speaking, as a
15 non-toxicologist, from what little I have seen in the
16 literature I would expect that probably yes.

17 Q Which ones would you
18 expect would be more sensitive?

19 A Oh, I see what you
20 are driving at here. If you are looking for a general
21 opinion of what the most sensitive species are
22 likely to be, I would say, yes, in my opinion that it
23 would be Arctic char and Arctic grayling. I think
24 that certainly would have to be verified though.

25 Q Sir, you deal with an
26 evaluation of the East of the Franklins route al-
27 ternative. I note that you don't deal with the
28 other alternative that was put forward by Canadian
29 Artic Resources Committee, and that was the Edge of
30 the Shield Route. Did you have a look at that as well,

Steir, Walter,
Steigenberger, Millen
Cross-Exam by Marshall

1 sir?

2 A Other than essentially
3 taking a quick look at the proposed alignment, no,
4 sir, I did not.

5 MR. ANTHONY: Perhaps before
6 the witness proceeds to answer the question I may make
7 it clear that the Canadian Arctic Resources Commit-
8 tee is not proposing any particular alignment or route.
9 We are not proposing a pipeline as such. We are
10 presenting merely the views of the various people
11 about the possible alternatives. There is no proposal
12 there by CARC with respect to that route or any
13 other route.

14 MR. MARSHALL: Well, it was
15 in Dr. Roed's evidence and I gather you have looked
16 at the alignment that such a route would have?

17 A Other than a rough
18 review of the alignment no, sir, I do not.

19 Q And you would have been
20 aware that the proposed route would go through
21 Great Bear and Great Slave Lakes?

22 A I recall that, yes.

23 Q Do you have any comment --

24 A Great Slave Lake?

25 Q Yes.

26 A I do not recall that,
27 no. I remember it did go through Great Bear.

28 Q Well, if you could take
29 my word for it that the alignment would go through
30 both of those lakes, do you have any comments --

Stein, Walker
Steigenberger, Millen
Cross-Exam by Marshall

THE COMMISSIONER: Which one was that again?

MR. MARSHALL: The Edge of the Shield --

THE COMMISSIONER: Oh, Edge of the Shield, right.

MR. MARSHALL: If you will take as a given that the alignment would go through both of those lakes, can you offer any opinion as to the impact that such alignment might have on fish resources?

A You are referring specifically now to the crossing of the lakes only, is that correct?

Q Well, if your examination was such that you formed an opinion as to the impact on fish resources generally of that alignment, that is fine. If not, limit your comments to the two major lakes.

A Well, I think that I could only offer a very general comment here and it would be specific to the lakes. The expected impact on the resource itself I would certainly want more time, I think to review that. However, you are now dealing with two areas that have considerable fisheries on them. In the case of Great Slave, the largest, I believe -- or, I am sorry, commercial fishery in the N.W.T., and of course a quite extensive sport fishery on Great Bear. I think that these would probably be two areas that I would expect that there would be an

Stein, Walker
Steigenberger, Millen
Cross-Exam by Marshall

1 impact on.

2 Q Now, sir, with respect
3 to the East of the Franklins Route. I was wondering,
4 the detail in which you had examined that.

5 A Well, you will note in
6 our testimony that we have essentially no field
7 fisheries information on that area whatsoever. In
8 some situations we did through our synoptic
9 survey efforts get into the headwaters, I think, of
10 some areas that would be crossed. So, a lot of that
11 is very speculative.

12 Q I was wondering whether,
13 sir, you have followed the evidence given before this
14 Inquiry in the cross-examination on that evidence
15 that pertained to this route? Have you followed
16 the transcript?

17 A I have not read the
18 transcripts on that, no, sir.

19 Q There was an indication
20 of a requirement for perhaps three major access roads
21 going from the Mackenzie to the East of the Franklins
22 route. Would you have been aware of that?

23 A I am afraid that I can't
24 recall that offhand, no, but ^{as} I did mention in the
25 testimony I was aware that there would probably be
26 increased road construction necessary from the wharf
27 and staging sites on the Mackenzie presumably to the
28 actual right-of-way.

29 Q So you would be aware
30 that the Mackenzie then would still be required as a

Stein, Walker
Steigenberger, Millen
Cross-Exam by Marshall

major logistics support facility? Major logistics
route ?

A That is the alternative
I am aware of right now.

Q Yes, from a stockpile
or staging site on the Mackenzie it would be necessary
to have all-weather roads that would cross over to
the area in the East of the Franklins corridor?

MR. ANTHONY: I believe the
witness has indicated first of all that he was not
aware of the specifics of the evidence given; and
secondly, I don't think that was the uncontroverted
evidence that there is any all-weather roads required.
I believe Mr. Roed's view of it was that this could
be accomplished through winter roads just as they
propose to use winter roads in the other area. I
think the witnesses made it clear of the extent
of his ability to comment on the logistics of this
proposal.

MR. MARSHALL: I suppose
none of this might matter very much in view of Mr.
Anthony's comment that CARC isn't proposing it, sir,
but I just want to pursue a couple of small points on
it. If it were necessary to have three all-weather
roads from the Mackenzie Valley over to the East of
the Franklins corridor discussed by Dr. Roed, would
that cause you concern as a fisheries biologist?

Stein, Walker
Steigenberger, Millen
Cross-Exam by Marshall

1 A All-winter roads.

2 Q All-weather roads.

3 A Sorry, all-weather roads.

4 Yes, potentially would cause me concern but I don't
5 think any more concern than it would to construct an
6 all-weather road in relation to the CAGSL proposal.
7 Now I am speaking really here of gross ignorance of
8 the proposal itself, but it would seem to me that
9 any such road would probably parallel a tributary or
10 tributaries of the Mackenzie, and conceivably then
11 would result in less stream crossings.

12 Q Do I take it that you are
13 not greatly concerned with an all-weather road parallel-
14 ling streams, tributary to the Mackenzie?

15 A Well, parallelling within
16 a given distance, sir, certainly I would be.

17 Q I believe it was Dr.
18 McCart's evidence that his concern generally is with
19 all-weather roads parallel ing streams as opposed to
20 crossing them at right angles. Do you not share that
21 concern?

22 A Again I say I'm speaking
23 very generally now, and I certainly would not propose
24 that any highway parallel any water course within --
25 without having say a reasonable buffer zone. I would
26 not like to define "buffer zone" beyond that, but I
27 would certainly not expect them to be within an
28 area, I would hope they at least would not be within
29 an area that would result in impact on the water course.

30 Q Well, I suggest to you,

Stein, Walker
Steigenberger, Millen
Cross-Exam by Marshall

1 sir, that you haven't done sufficient studies, nor do
2 you have sufficient familiarity with the proposal put
3 forward by Dr. Roed to be able to express an opinion
4 as to whether or not construction of east of the
5 Franklins route would be potentially more or less
6 disruptive to aquatic resources than a similar line
7 down the Mackenzie.

8 A I had felt that I had
9 qualified that sufficiently, sir, when I commented that
10 based only on the reported greater abundance of
11 granular materials within the area and the reduced
12 number of stream crossings of the pipeline itself
13 that I would suspect it would probably result in less
14 impact than would a similar line down the Mac kenzie
15 Valley.

16 Q But you would agree with
17 me that overall you just don't know .

18 A I think I have more or
19 less said that, sir.

20 Q Well, sir, near the bottom
21 of page 17 of your prepared evidence, you say:

22 "For example, if a stream system is crossed
23 by the pipeline, habitat disruption and losses
24 to both invertebrate and fish populations will
25 likely result from increased sedimentation."
26 Sir, my argument is with the word "likely." I suggest
27 to you that the word ought to be "possible" rather than
28 "likely". I say this because I suggest it's surely
29 a function of whether or not there are any invertebrates
30 or fish populations in that area.

Stein, Walker
Steigenberger, Millen
Cross-Exam by Marshall

1 A I think that qualification
2 is partly true, but I would venture to say that it's
3 highly unlikely that any streams being crossed in the
4 Mackenzie Valley are going to be completely devoid
5 of fish and/or invertebrate populations.

6 Q Would you make that same
7 statement restricted to the area that would likely be
8 affected by any construction activity?

9 A The area within the
10 stream to be affected?

11 Q I'm suggesting to you
12 that perhaps in an area downstream of the crossing, for
13 a distance of a mile or two, there might be some impacts
14 but beyond that, impacts would likely not be noticed
15 at all. Do you agree or not agree with that?

16 A Referring specifically
17 to sedimentation, I don't think that that statement
18 can be made. There are too many variables to be con-
19 sidered. By that I mean flow conditions at the particular
20 time, the nature of the bank and river bed, sediments,
21 the distribution of the resource itself within the river.
22 I don't think that you could say that to my way of
23 thinking at least that that impact is only going to
24 be felt for a mile or two down. It's too variable.
25 You'd have to get very site specific on it.

26 Q I wonder if you have any
27 information as to how far downstream sedimentation
28 affects occur?

29 MR. ANTHONY: I think the
30 witness has indicated that that depends on a number of

Stein, Walker
Steigenberger, Millen
Cross-Exam by Marshall

1 factors that he's enunciated, and surely that's not
2 a fair question or one that's possible for the witness
3 to answer.

4 MR. MARSHALL: Well, if he's
5 done some studies or has some reports that he can
6 refer to, he can answer the question.

7 MR. ANTHONY: Well, I think
8 the witness has indicated that it varies and it depends
9 on a number of factors. All he can do is outline the
10 various factors.

11 THE COMMISSIONER: Just ask
12 Mr. Stein if he feels he can add anything to what he
13 said on that subject.

14 A I don't feel I could,
15 Mr. Commissioner.

16 MR. MARSHALL: Q Well, do I
17 take it that you're not aware of any studies that
18 would indicate how far sedimentation affects can be
19 felt downstream?

20 A I would say that I am
21 not personally well enough aware of these studies that
22 I could refer to them, no sir.

23 Q Have you read Dr.
24 McCart's studies dealing with this subject?

25 A Well, I've read so many of
26 Dr. McCart's reports I'm not sure of that one.

27 MR. MARSHALL: Well, I see it's
28 five o'clock.

29 MR. RYDER: Mr. Bayly's
30 children have arrived.

Stein, Walker
Steigenberger, Millen
Cross-Exam by Marshall

1 THE COMMISSIONER: Yes, they've
2 taken Mr. Bayly away.

3 Well, I think that' that's
4 enough for the day, unless anyone has any violent
5 objection to adjourning at five.

6 Well, we'll adjourn now and
7 come back at 9:30 in the morning, and Mr. Ryder, maybe
8 you would just have a chat with counsel and see if
9 some fair allocation of the time that we have tomorrow
10 for this panel could be made. It may be that cross-
11 examination will take is into Wednesday as well. But
12 I understand Mr. Anthony has another panel to present
13 this week and I think we should try to get along as
14 far as we can by the end of the week.

15 So we'll adjourn till 9:30 A.M.

16 (DRAFT REPORT BY DEBOCK, DENNINGTON & SURRENDI
17 DATED JULY 1975 MARKED EXHIBIT 374)

18 (QUALIFICATIONS, LIST OF REPORTS & EVIDENCE OF
19 STEIN, WALKER, STEIGENBERGER & MILLEN MARKED
20 EXHIBIT 375)

21 (GUIDELINES FOR PROTECTION OF FISH RESOURCES IN
22 N.W.T. DURING HIGHWAY CONSTRUCTION & OPERATION
23 MARKED EXHIBIT 376)

24 (EVALUATION OF FISH RESOURCES OF MACKENZIE RIVER
25 VALLEY, VOL. I, 73-1, APRIL 1973 MARKED EXHIBIT
26 377)

27 (FURTHER EVALUATION OF FISH RESOURCES OF MACKENZIE
28 RIVER VALLEY, 74-7, JUNE 1974 MARKED EXHIBIT 378)

29 (EVALUATION OF FISH RESOURCES OF MACKENZIE RIVER
30 VALLEY, 75-6, 1975, MARKED EXHIBIT 379)

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(NORTH YUKON FRESHWATER FISHERIES STUDIES, 1973,
74-20 MARKED EXHIBIT 380)

(FRESHWATER AQUATIC ECOLOGY IN NORTH YUKON,
Oct. 1973, 73-21 MARKED EXHIBIT 381)

(FRESHWATER FISHERY RESOURCES OF NORTH YUKON,
73-6 MARKED EXHIBIT 382)

(ENUMERATION OF SPAWNING CHUM SALMON IN FISHING
BRANCH RIVER IN 1971/1972 MARKED EXHIBIT 383)

(NORTH YUKON FISHERIES STUDIES, 1971-1974,
VOL. I, MARKED EXHIBIT 384)

(PIPELINE CONSTRUCTION GUIDE, CENTRAL & SOUTHERN
B.C., JULY 1974, MARKED EXHIBIT 385)

(PROCEEDINGS ADJOURNED TO DECEMBER 16, 1975)

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